Operations Manual

The most important thing we build is trust.

User, Messenger VETA Receiver Decoder (MVRD)

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Revision History

Version	Date	Main Changes from Previous version	Created by
X1	02-24-2010	Initial Release	RM
X2	06-11-2010	Genlock and Embedded Audio are added	RM
X2A	09-30-2010	LCD Menu changes are added	RM
1	04-26-2011	Transferred from 100-M0145X2A	SDM
X3	09/09/11	change DC Power AMP 172166-1, pin 1 - +12v, pin 2 - return, pin 3 - chassis gnd	TM
X4	04/30/12	Add Phase 2a M2TE corresponding changes to MVRD, including new LAN GUI, & Aux data (M2TE)	TG
X5	10/11/12	Phase 2b updates including updating all figures to correspond with latest LAN GUI, new AES-C decryption, new menu under System Setup menu, the Output page which has Streaming Video Output setup parameters. Update new RF Receiver page with added RF controls.	TG

1. Acronyms

This section lists and describes the various acronyms used in this document.

Name	Meaning
16QAM	16-state Quadrature Amplitude Modulation
A/V	Audio/Video
AES	Advanced Encryption System
ABS	Basic Encryption System (8 bit)
COFDM	Coded Orthogonal Frequency Division Multiplexing
CVBS	Composite Video
BDC	Block-Down Converter
FEC	Forward Error Correction
GUI	Graphical User Interface
I/O	Input/ Output
KBaud	Kilobaud per second
Kbps	Kilobits per second
M2D	Messenger Decoder
M2T	Messenger 2 Transmitter
Mbps	Megabits per second
MDL	Messenger Digital Link
MER	Modulation Error Rate
MPEG	Moving Picture Experts Group
MVRD	Messenger VETA Receiver Decoder
NTSC	National Television System Committee
PAL	Phase Alternation Line
QPSK	Quadrature Phase Shift Keying
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
RX	Receiver
S/N	Signal-to-Noise Ratio
THD	Total Harmonic Distortion
TS	Transport Stream
TX	Transmitter
VDC	Volts (Direct Current)
VR	VETA Receiver
VT	VETA Transmitter
VDR	VETA Digital Repeater
UDP	User Datagram Protocol
VNA	VETA Network Adapter

2. Introduction

2.1 About the Manual

Cobham User Manuals focus on providing the end user an easy to understand operational instructions to quickly setup and deploy the equipment. The Cobham Technical Operation Manuals focus on the technical details and setup of the equipment. The Technical Manuals also provide a more in depth explanation of the settings and specifications of the equipment that technicians can use to verify the operational status.

This manual provides information on how to operate the MVRD (Messenger VETA Receiver Decoder) as well as pertinent technical information related to the overall system.
The manual is divided into three main sections:

Getting started and basic operation
This section describes to users how to deploy and use a MVRD unit (section 4).

Advanced operation
This section describes the operation of the system in more detail, concentrating particularly on advanced use of Local Control Panel and the GUI (section 5).

Technical reference
This section provides technical specification and control protocol data and will be of interest to those integrating the MVRD into larger systems or using unusual configurations (section 5.3).

The MVRD is pre-configured by Cobham prior to shipment (based on customer requirements), thus is ready to work "right out of the box".
MVRD is supplied with the following cables:

- 100-C0484 Power Cable w/AC/DC Power Supply
- 4001950 MVRD USB Control Cable

Additional cables and antennas may be delivered by Cobham based on customer application. Contact Cobham for further information.

2.2 Warranty

Cobham offers a 12 month standard product warranty. During this period, should the customer encounter a fault with the equipment we recommend the following course of action:

- Check the support section of the website for information on that product and any software/firmware upgrades.
- If fault persists call our support line and report the fault. If fault persists and you are informed to return the product, please obtain an RMA number from the Cobham support department or website and ship the equipment with the RMA number displayed and a description of the fault. Please email the support section the airway bill/consignment number for tracking purposes.

Depending on the nature of the fault Cobham endeavor to repair the equipment and return it to the customer within 14 days of the item arriving at our workshops. Obviously it is impossible to cater for all types of faults and to manage 100% replacement part availability, and delays are sometimes inevitable. Please contact Cobham for details of packages that can be tailored to meet your individual needs, whether they are service availability, technical training, local geographic support or dedicated spares holdings.

2.3 Safe Operating Procedures

- Ensure that the power supply arrangements are adequate to meet the requirements of VETA product.
- Operate within the environmental limits specified for the product.
- Only authorized, trained personnel should open the product. There are no functions that required the User to gain access to the interior of the product.

3. General System Information

The MVRD (Messenger VETA Receiver Decoder) receives and demodulates DVB-T 2 k carriers' signals with bandwidths of 6, 7 or 8 MHz; additionally, optional 1.25 or 2.5 MHz RF bandwidths with 400 carriers allow both increased reception range and larger quantity of simultaneous A/V links to operate in the same frequency band. The wider bandwidths provide greater throughput that allow the system to transfer the highest quality video.

The MVRD has dual Diversity inputs and internal RF Block-Down Converters (BDCs) with a user selected (at time of purchase) frequency band. The MVRD's Maximal Ratio Diversity Combiner provides optimum reception in difficult fading and multipath environments. Additionally, the Diversity combining can provide up to 2.5 dB in link performance, increasing the receiver's sensitivity to -97.5 dBm at 8 MHz bandwidth.

One of the biggest problems encountered in the transition from analog to digital A/V systems has been the inherent digital coding/decoding delays that in some digital systems are 400 ms or more. The VETA Transmitters & Receivers employ internal (MPEG-2 or MPEG-4)[1] Encoders and Decoders with specially designed 'low-delay' coding technology, which provides an end to end latency down to 44 ms *without* the introduction of any further MPEG encoding artifacts. This ensures that the picture you see is what is happening *now* - crucial for applications such as surveillance, and law enforcement, where personnel are reacting to real-time events.
The MVRD also includes internal low-latency Audio/Video Decoder (MPEG-2 or MPEG-4)[1] and output circuits that provide video, two audio and data channels. Security of transmission is ensured by the use of Standard ABS encryption or, for greater security, the optional AES 128 or 256 bit scrambling algorithms.

Control and status monitoring can be accomplished via a WEB interface (LAN GUI) or through the local LCD control panel The MVRD has a built in WEB server; using an external PC and a browser (such as Microsoft's IE9 or Mozilla's Firefox) the WEB page can monitor critical RF parameters such as Signal to Noise Ratio (SNR), RF Input Frequency, Packet Errors, as well as many other functions as shown in section 7 "LAN GUI WEB INTERFACE". These same functions can be addressed using the local LCD control panel (see section 6, "MVRD Local Control").

The MVRD includes an optimal internal low-latency Audio/Video (SD Only) MPEG-2/4 Part 4 Decoder and output circuits that provide composite video and two audio channels. Ancillary Data extraction is available in all Modes. Security of transmission is ensured by the use of Standard ABS encryption or, for greater security, the optional AES 128 or 256 bit scrambling algorithms.

[1] Option dependent, user selectable

3.1 Product Control & Status Monitoring Approach

Cobham Transmitters and Receivers provide programmable presets or configurations that can be set up through special programming software by Administrators. Configurations are selected by the user though the WEB interface. Administrators define the configurations for specific applications. Each configuration completely defines all of the Unit parameters including center frequency, output RF power level (for TX only), modulation parameters, Video, Audio, User data and encryption. Field personnel will select specific configuration via pre-determined guidance from the Administrators. Matching the Transmitter operation to the Receiver operation is as simple as selecting the same configuration for both. For example: If the Transmitter is set to configuration #3, then the Receiver needs to be set to configuration #3 for them to operate together.

3.2 Understanding Configurations

MVRD equipment features sixteen user selectable and programmable configurations. These allow the user to store the most commonly used channels for quick selection. The *Current Configuration Group* is defined as the number of the currently selected configuration 1 to 16. The *Current Configuration Group* can be changed by loading one of the 16 Configuration Groups under the *System Setup\Receiver* menu using the WEB interface or under the *Main\Setup\Receiver menu* using the local LCD control panel. The parameters in the Current Configuration Groups can be edited using the WEB interface or the local LCD control panel. Any modifications made to system settings will be saved in the current Configuration Group. All changes that are applied are saved permanently.

4. Initial Check Out

Prior to installing a MVRD unit into the desired target environment, an initial checkout should be performed to ensure proper operation of the unit. The initial checkout consists of configuring a basic MDL (Messenger Digital LINK) wireless link.

4.1 Deploying and Operating the MVRD

The MVRD is a tactical digital video receiver-decoder and the following guidelines should be employed when using the equipment.

- Depending on the RF environment (line of sight or non-line of sight) and the power of the transmitter (100 mW or 1 W), the MVRD will operate at a range typically 300 m to 1 km from the target transmitter in an urban environment.
- If the MVRD is being operated inside a building or vehicle, better results may be achieved by using the external antenna function and deploying the antennas to the outside of the building or vehicle.
- To prevent damage to the MVRD, it should not be operated too close to the transmitter (within 5m typically, further if the transmitter is greater than 1W in power).

Figure 1 shows a basic MDL configuration wireless link. The steps necessary to setup the configuration shown are stated below (note that the M2TE, Messenger 2 Transmitter Enhanced, is the latest generation of the M2T series transmitter and can also be used with the MVRD. In the remaining portions of this manual where it states the M2T, the M2TE can be substituted and used as well. You can reference the M2TE manual, 100-M0171 online at:

http://www.cobham.com/about-cobham/aerospace-and-security/about-us/tactical-communications-and-surveillance/carlsbad/products/cofdm-tranmitters/m2te.aspx

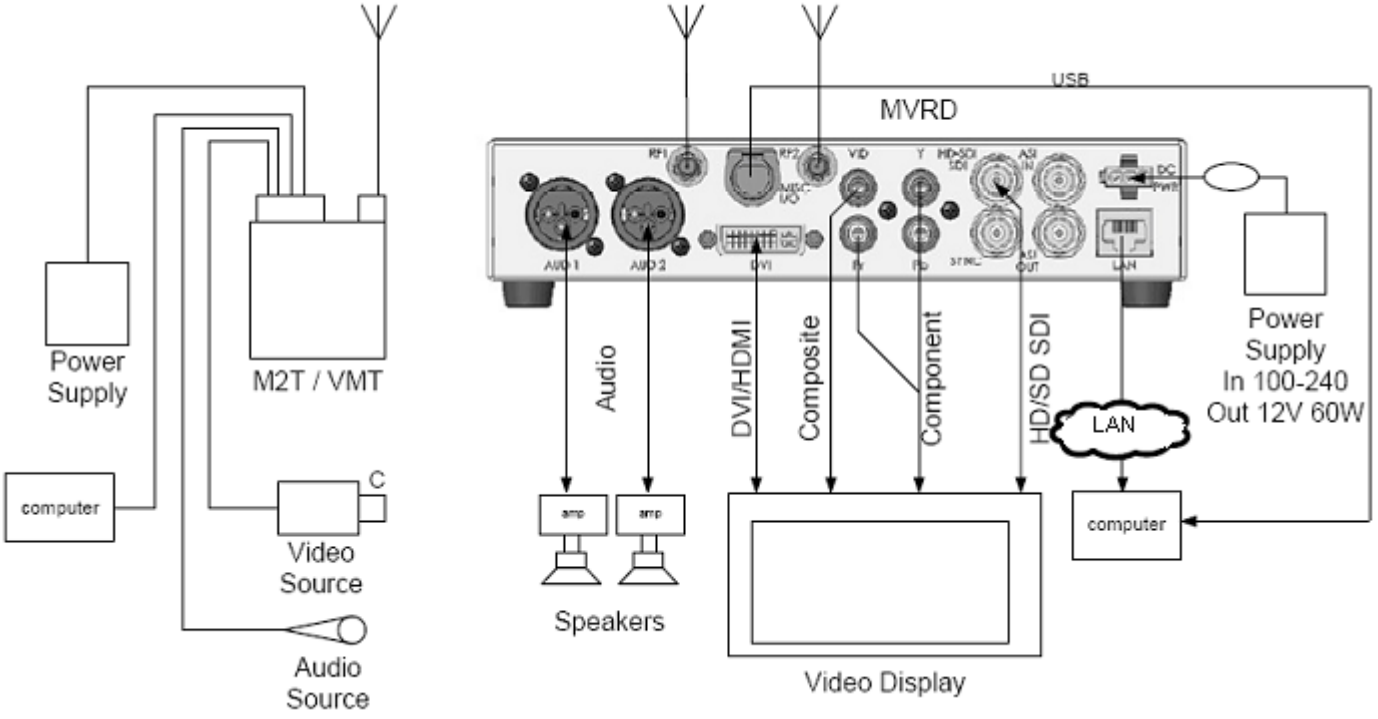


Figure 1 – Basic MDL Setup

- Install Omni-directional antennas (or ones best suited for the application) onto the RF IN A and RF IN B ports on the MVRD and one on the SMA RF connector on the Messenger 2 transmitter or VETA Messenger transmitter. If using VETA Transmitter, refer to Corresponding manual for interfaces.

☛ Using the VMT as your test TX allows you to check NTSC or PAL with MPEG-2 or MPEG-4 part 2 compression. In this mode, the only valid output video source on the MVRD is the composite output port.

- Attach the M2T (Messenger 2 transmitter) power cable and apply **+12 VDC** to the red pigtail and GND to the black pigtail. Ensure power supply can supply at least 1.5A at +12 VDC.
- Attach a composite video source to the BNC video of either TX for SD testing and analog audio source to the XLR input cable's that is located on the M2T breakout cable. Connect a HD-SDI source to the M2T's BNC (Female) SDI input for HD/SD AVC testing.
- If you are using a M2T with factory default set-up groups, then set the first 2 rotary switches on the M2T to the desired preconfigured setting 1 – 20. See Appendix B for matching the M2T's 20 set-ups with the MVRD's 16 set-up

☛Note: Using the M2T as your test TX allows you to check NTSC, PAL, 480p, 720p, 1080i and 1080p with AVC (MPEG-4 part 10) compression. In this mode, all video output ports will be active. The composite output port is driven by an internal video scaler to produce a SD monitor output even when the system is processing SD. The video scaler currently has limited functionality.

- Attach the appropriate video output port on the MVRD to its matching video input port of a video display.

- Attach the audio output port on the MVRD to the input port of an audio amplifier.
- Attach the power cable assembly to the MVRD and AC power source.
- Turn on the audio/video source and audio amplifier and video display.
- Turn on the MVRD with the "**PWR**" switch on the front panel (up is ON). The 2 front LED's will turn on then off and the front display will light up.
- Once the MVRD has powered-up, use the front user interface to set the appropriate preconfigured setting to match the transmitter.
- After approximately 5 seconds the front "**LOCK**" LED should turn a solid green and video should appear on the video display.
- If the green "**LOCK**" LED light does not come on and/or there is no video playing on your display, check the following:
    - Ensure the receiver and transmitter configuration numbers are set accordingly to the configuration map.
    - If not, change the settings on either the transmitter or receiver so they match up.
    - Ensure the MVRD and the TX is turned **ON**.
    - Ensure the video and audio are properly connected to the MVRD and the TX.
    - If the TX and RX are physically too close to each other, the RX may overload causing no or distorted Video. You may move the TX & RX further apart.
    - If the red LED stays on and the green led goes off, recycle power. If it persist contact www.cobham/tcs.

The initial checkout described above is simply to check the basic video operation of the MVRD unit. Audio can also be checked by enabling audio in the test TX. See the operator's manual of the TX that you are using.

Figure 2 – OSD

4.2 Using of the On Screen Display

NOTE: The OSD display discussed below only applies to the composite video output ports.

On Screen Display (OSD) tool, shown in Figure 2, is an extremely useful tool for system set-up and diagnostic. The displayed diagnostic data includes a spectrum display, signal to noise data, input power level and frequency. The received spectrum display is useful when checking for interference and signal quality.

After power up, OSD is available only when unit is locked to incoming RF signal. If the lock is lost afterwards, OSD still will be available.

When setting a VETA system up, the OSD should be used in the following way.

- Channel is clear. With the transmitter OFF, check that the channel is empty of interference signals, this is confirmed by ensuring that the reported power in the channel is at –95 dBm or lower and that the spectrum is shown as a rounded dome with no obvious spikes or tones.
- Check Quality of Link. Switch on the transmitter and confirm that SNR is 6 or greater and that power level is at least –92 dBm or greater. This represents approximately a 5dB margin. Failure of the link will occur when the power level reaches –97 dBm or the SNR reaches 3 dB.

5. Hardware Overview

5.1 Front Panel Description

Front Panel view of MVRD is shown in Figure 3.

Figure 3 – MVRD, Front View

5.1.1 Power Control

Pushing the top portion of the PWR switch turns the MVRD on.

5.1.2 Local Control Panel

Local Control Panel consists of Display (Backlit LCD, Dual line, 16 characters per line) and 4-button keypad (ENTR, CTRL, Up ↑ and Down ↓ arrows).
Control "*CTRL*", is used to switch between control or status screens or multiple menu item groups
Enter, "*ENTR*", is used to switch current submenu and is used to confirm a selection.
UP ↑ and Down ↓Arrows are used to move up and down menu items or option selection within a menu item.
Detailed front panel operations are described in Section 5.1.

5.1.3 Status Indicators

Lock LED (green LED) lights when the MVRD receives a valid MPEG Transport Stream (TS). There are three valid input source selections; RF, ASI, and LAN for the TS. When RF is selected as the source the Lock LED also means that the receiver is receiving and demodulating a transmitted signal.
The red Error LED indicator lights when an error occurs in the unit. There are several reasons that cause the red Error LED to light including:

- PMT (Program MAP Table) indicates services that are not present in the TS
- Incompatible Compression Type – Cannot decode the incoming data.
- Internal HW/FW Error – Will output a code that is meaningful to factory personnel.
- Genlock is ON but with an incorrect reference signal on the Sync input.

5.1.4 A/V Connectors

- Composite Video, Connector Type: RCA-F. This port is active for all valid operating modes of the MVRD. When processing SD MPEG-2, MPEG-4 Part 2 or MPEG 4 Pat 10 (AVC) the composite video output is directly from the associated decoder. When processing HD AVC the composite video comes from an internal Video Scaler.
- AUD 1 and AUD 2, Connector Type: RCA-F, Single Ended Line Level. Two RCA connectors are provided for audio outputs Left and Right. The output level is nominal line level with output impedance of 50 ohm. Audio is single ended. There are no audio gain adjustments.

5.2 Rear Panel Description

The Figure 4 shows rear view of MVRD unit. All the connectors are described below.

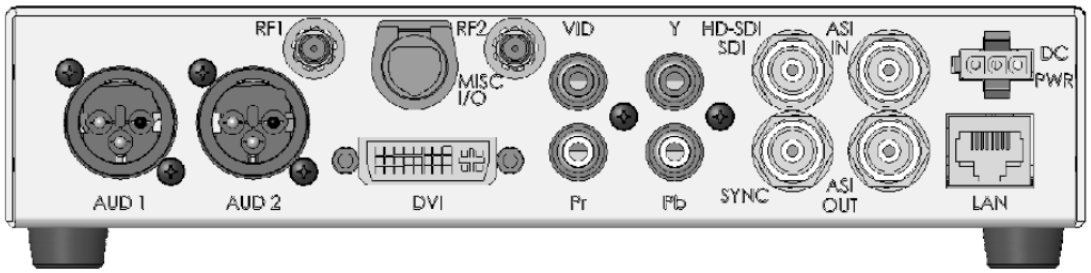


Figure 4 – MVRD, Rear View

5.2.1 DC Power

Mating Connector Type: AMD Tyco Electronics PN: 172166-1.

5.2.2 AUD1, AUD2

Signal: Audio, Balanced
Connector Type: XLR-M, 3 pin

5.2.3 RF1 and RF2

RF1 & RF2 – Receiver RF Inputs
Connector Type: SMA-F
Maximum Operational Input: -20 dBm
Damage Level: > = +17 dBm

5.2.4 MISC I/O

Miscellaneous connector – USB Control and Digital Audio Output[2]
Connector Type – Hypertronics D-series Circular connector

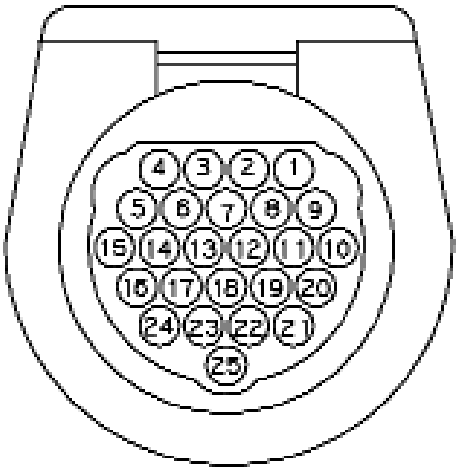


Figure 5 – Miscellaneous connector front view

5.2.5 DVI

Signal: Video, Component
Connector Type: DVI-I Socket – Female
☛Note: Can be converted to HDMI (Video Only) with external adapter. (Sold Separately)

5.2.6 Composite and Component VIDEO Outputs

VID
Signal: Video, Composite
Connector Type: RCA-F

Y, Pr, Pb
Signal: Video, Component
Connector Type: RCA-F

5.2.7 HD/SD-SDI

SMPTE standardized Serial Digital Interface (High or Standard Definition)
Source: Follows active selection of TS source.
Connector Type: BNC-F

[2] In development

5.2.8 ASI In

Inputs MPEG2 or MPEG4 compressed signal.
TS: DVB Compliant
Connector Type: BNC-F

5.2.9 ASI Out

Outputs MPEG Transport Stream; source is ASI In (loop through) or RF In.
TS: DVB Compliant
Connector Type: BNC-F

5.2.10 SYNC

Sync is an input is used to ensure coincidence of signals in time at a combining or mixing or switching point.
Connector Type: BNC-F
Function: Genlock, AVC HD/SD only

5.2.11 LAN

Provided for Ethernet connection; can be used for Video Streaming (in or out), updating firmware and control using the WEB interface.
Connector Type: RJ-45

5.3 Using breakout cables

5.3.1 Power Cable w/AC/DC Power Supply

Use pigtail Power Cable to connect from an AC outlet to the power connector on the MVRD. See for detailed information on this cable (DWG #: 4001954).

☛Note: you can wire directly to the DC Power connector to run the MVRD off of DC.

5.3.2 MVRD CTRL Cable

Use 4001950 to connect from the MISC I/O circular connector to USB connector on the Personnel Computer. With the proper GUI interface new group configurations can be downloaded with this interface.

6. MVRD Local Control

6.1 Introduction

As with all Cobham's surveillance products, the MVRD uses "Set-Up Configurations"/ "Groups" (Up to 16) to allow the receiver to be completely pre-configured by Administrators prior to deployment. These set-up groups define all of the operating parameters (e.g. frequency, bandwidth, FEC, Decryption On/Off) available to the users. Users on both the TX and RX side only need to be directed to which set-up group number to use. Normally, the TX and RX would each use the same set-up group number.
Cobham offers several control options, including the local LCD control panel as explained in this section and the WEB interface (see section 7) for remote control and status monitoring.

The MVRD's front panel display and keyboard are used for both local control and status monitoring. The MVRD has a local control panel that allows the selection of up to 16 set-up groups/configurations. Status indicators are provided for RF Signal Strength, Demod lock, SNR, the presence of a Transport Stream, audio, video, data, and Decryption Active.

This section describes the various displays and controls that are used for local control. In general the *CTRL* button sequences through the top level menus or if in a submenu it will traverse through each of the menu options within the submenu. The *ENTR* button allows the user to enter a submenu if presented with a choice to do so and it also allows the user to confirm a selection when more than one option is available. In some cases the *ENTR* button can act as a shortcut and allows the user to jump to a different menu. The *UP* ↑ and *DOWN* ↓ arrows allows the user to choose between various options when presented with them. The following symbol ⇳ indicates that user has other options to select from.

6.2 Main Display

The flow chart of the MVRD main display is shown in Figure 6. The LCD backlight lights up when the power switch is turned on. It takes an about 5 seconds for unit to boot. The initialization screen displays the product type. After another 5 seconds the display changes to Main Status Display. Depending on the mode that MVRD is in (ASI In or RF In) different menus will be displayed on the Front Panel. The screens are also a little different depending on the format (AVC or MPEG2) of the incoming signal.
Pressing the *CNTRL* button takes you through a series of *Select* or *Status* menus. Pressing Enter button takes you into the corresponding submenus.

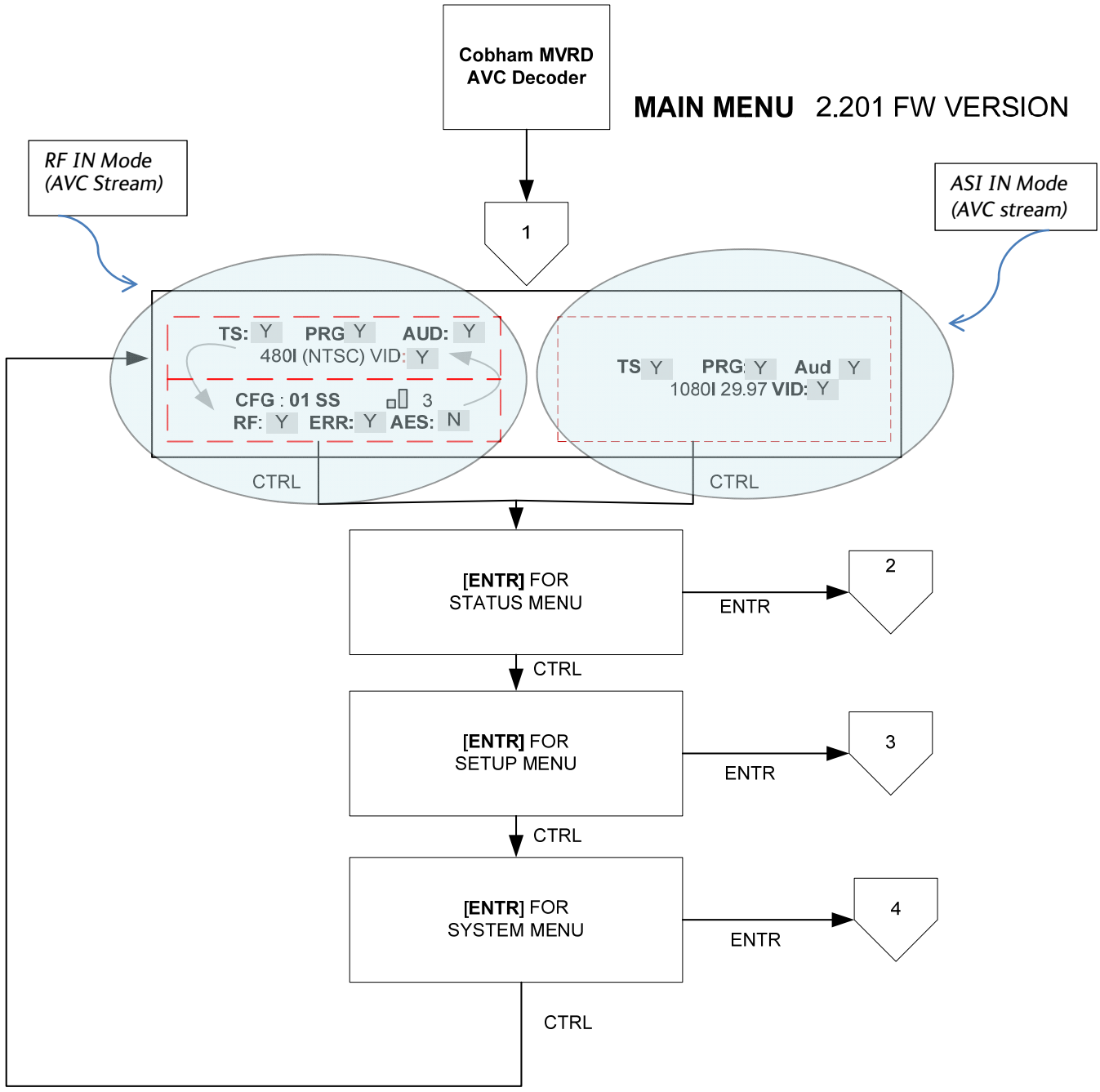


Figure 6 – Main Menu

6.2.1 Main Screen in *ASI IN* Mode

If the unit is in ASI In mode, the main screen will look as shown below for MPEG2 and AVC respectively:

ASI In, MPEG2

T	S	:	N		P	R	G	:	N		A	S	I	I	N
											V	I	D	:	N

ASI In, AVC

T	S	:	Y		P	R	G	:	Y		A	u	d		Y
1	0	8	0	I	2	9	.	9	7		V	I	D	:	Y

- ***TS***: – Transport Stream Present? Next character shows ***Y*** when the system is processing a TS and ***N*** when it is not.
- ***PRG***: – Program Present? Next character shows ***Y*** when the system detects at least one program in the TS and ***N*** when it is not; ***E*** – if the program is encrypted. Program is a group of services that includes one or more of audio, video and ancillary data. This is detected in the PAT table of the TS.
- ***ASI IN:*** – Indicates that the input mode is set to *ASI In* (*when a MPEG2 TS is present*).
- ***Aud:-*** Audio present ? Next character shows a ***Y*** when system detects audio PID is present in the TS (*when a MPEG4, AVC TS is present*) otherwise a ***N***.
- Lower left 10 characters – If Video is Present shows the video format.
- ***VID***: – Is Video Present in the Program? Next character shows ***Y*** when the system is processing a TS and ***N*** when it is not.

6.2.2 Main Screen in *RF IN* mode

If the unit is in *RF IN* mode, the main screen toggles (every 3 to 4 seconds) between the TS (transport stream)/Video screen status and the Configuration Group/RF status screen. The TS screen changes slightly depending on if it detects an MPEG2 TS or an AVC, H.264 TS. The two TS screens are shown below.

RF In, MPEG2

T	S	:	Y		P	R	G	:	Y			R	F	I	N
1	0	8	0	I	2	9	.	9	7		V	I	D	:	Y

TS/Video screen (with an MPEG2 TS)

RF In, AVC

T	S	:	Y		P	R	G	:	Y		A	u	d		Y
1	0	8	0	I	2	9	.	9	7		V	I	D	:	Y

TS/Video screen (with an AVC, H.264 TS)

Signal Strength(SS) is from 0 to 4

Main Status Display

C	F	G	:	1	0			S	S	:					4
R	F	:	Y		E	R	R	:	N		A	E	S	:	Y

Configuration Group/RF screen

- ***CFG***: – Displays *Configuration Group* currently in use. The two digits to the right show the current configuration group (1 to 16).
- ***SS***: – Signal Strength. The digits to the right show the RF signal strength as both a bar graph and a level number. The channel with higher Signal Strength is displayed.
- ***RF***: – **Y/N** indicates that the receiver is locked to an incoming signal or not.
- ***ERR***: – Error Indicator. There are several reasons for Error to occur, including:
  - TS is not present
  - PMT (Program MAP Table) indicates services that are not present in the TS
  - Incompatible Compression Type , cannot decode the incoming data
  - Internal HW/FW Error, will output a code that is meaningful to factory personnel.
- ***AES***: – ***Y*** means that the incoming stream is encrypted. To receive and process the stream correctly decryption must be enabled with the correct key. ***N*** means that the incoming stream is not encrypted.

6.3 Status Menu

This menu can be accessed from the Main Display by pressing *CNTR* button once then the ENTR button. The last screen display (in this menu) offers a chance to return to the *MAIN* menu. The flow chart of MVRD Status Menu is shown in Figure 7.

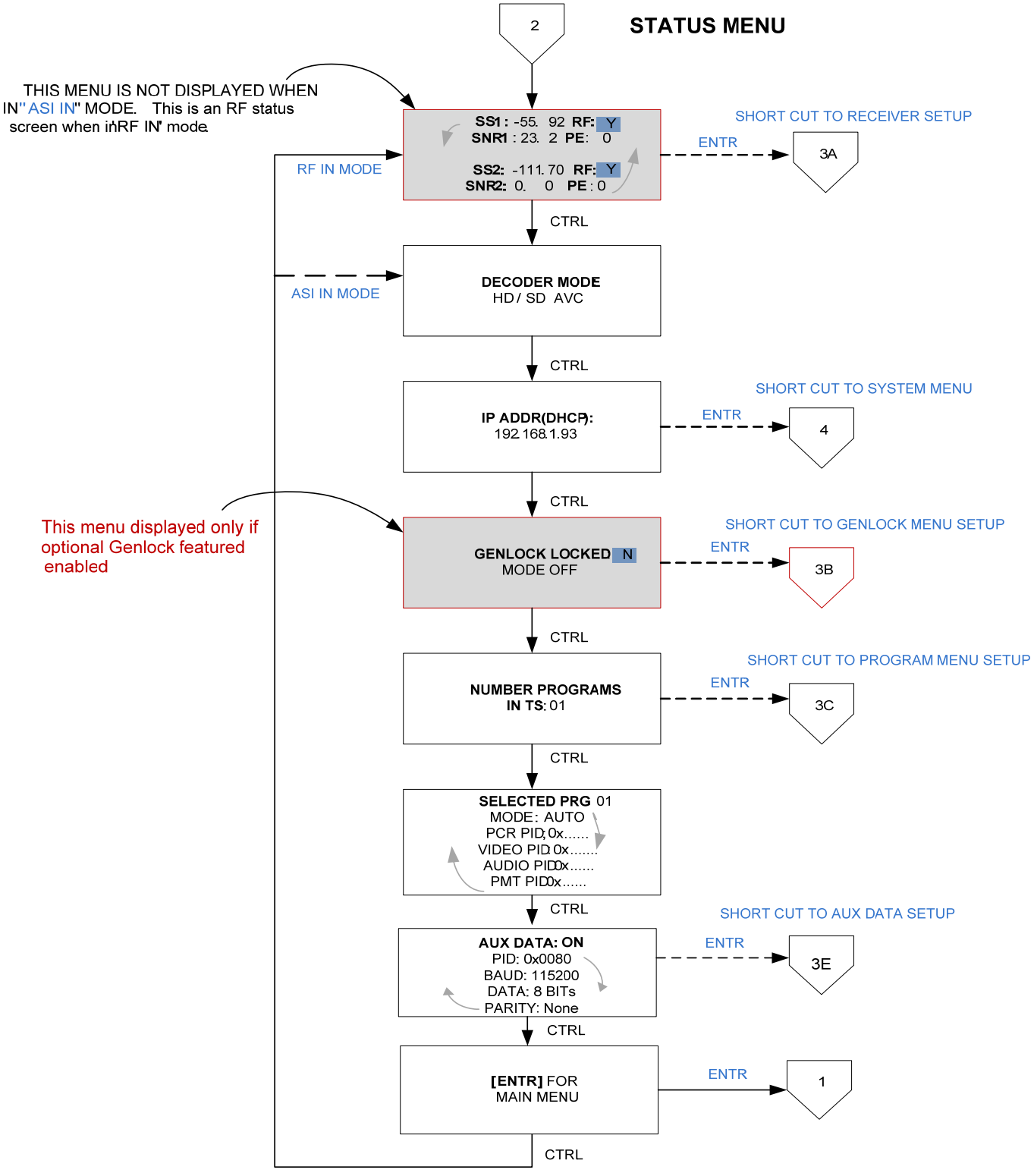


Figure 7 – Status Menu

6.3.1 Signal Strength

If the Input Source is set for ASI, the signal strength screen is not displayed; the Status Menu then starts with the Decoder Mode screen as shown in section 6.3.2.

If the Input Source is set for RF, the signal strength screen shows the signal strength (in dB), SNR (Signal to Noise Ratio in dB), Packet Errors (PE) and if RF is present (indicated by a "Y" or "N") of each of two RF channels. RF channels SS1 (signal strength 1) screen and SS2 (signal strength 2) screen toggle every 3 to 4 seconds.

S	S	1	:		-	5	2	.	0	8		R	F	:	Y
S	N	R	1	:		2	4	.	5		P	E	:		0

Signal Strength Screen

6.3.2 Decoder Mode

This screen shows the format of the incoming signal. If the decoder is not locked to the incoming signal (no TS present or the TS is not recognized as valid), then *UNKNOWN* is displayed. If the decoder is locked then the second line shows the Video format type such as "HD/SD AVC" or "MPEG2".

D	E	C	O	D	E	R		M	O	D	E	:			
U	N	K	N	O	W	N									

Decoder Mode screen

6.3.3 LAN IP ADDRS Status Display

The current IP Address is displayed in this screen. If the default DHCP Client is selected then an IP cable (from a network or a standalone PC) must be attached to the LAN input connector (on the rear of the M2D) and it must be on a network or PC which provides DHCP services otherwise a *0.0.0.0* is displayed as the IP address. If STATIC addressing is selected then it provides an initial default static address. This address can be changed using an Internet Browser and opening up the MVRD WEB interface page (see section 7). The internal WEB page of the MVRD has a "Network" configuration page in which all the parameters associated with addressing can be changed. The default mode in which the unit is shipped is a Static IP address of *192.168.135*.

LAN IP ADDRS Status Display

I	P		A	D	D	R		(	D	H	C	P	)		
x	x	x	.	x	x	x	.	x	x	x	.	x	x	x	

☛NOTE: Keep in mind you will need to know the current IP address when upgrading firmware and interfacing with LAN GUI WEB interface.

6.3.4 Genlock Locked

Genlock is a means to ensure video signals are synchronized; this is an optional feature and is not available on all units.
This screen displays Genlock Status and is only displayed if the unit has the purchased Genlock Option and only functional when the decoder detects an HD/SD AVC format (not available in MPEG2 format). The first line shows if the Genlock signal is locked. The second line shows the current mode (On, Off or Auto), and then toggles to show the reference signal (Video format) and finally toggles to show the decoded Output Video format. The Genlock screen example is shown below.

G	e	n	l	o	c	k		L	o	c	k	e	d	:	N
M	o	d	e	:	N	/	A	-	N	O	T		A	V	C

- ***Genlock Locked:* –** shows if Genlock is locked.
- ***Mode***: – shows the mode and the reference signal/Output signal video format.

☞ NOTE: Pressing the ENTR key at this menu takes the user to the *Genlock Setup* Menu.

6.3.5 Number of Programs

This screen shows number of programs in current Transport Stream. Pressing the *Enter* key while in this screen will take you to Program Setup Menu.

6.3.6 Selected Program

This display shows the current selected program and then automatically cycles through PCR, Video, Audio and PMT PID-s for the selected program. The default mode is AUTO in which if there is more than one program it decodes the first program it finds in the PAT table. If the PROGRAM mode is set to MANUAL, the user chooses the program to be decoded. This is done from the PROGRAM Setup menu. Pressing the ENTR key while in this display take you immediately to the Program Setup menu.

6.3.7 Auxiliary Data

This display shows the current status of the Auxiliary Data. If Aux Data has been turned *ON* at the transmitter end (with data coming into it) and at the receiver end it is also *ON* then the display shows the PID number, the baud rate, the data bits (8 or 7) and the parity (none, even, odd). If there is no data present at the transmitter then the display only shows the PID number of the Aux Data but the other parameters (baud rate, data & parity) show as unknown.
If Aux Data has been turned *OFF* at the receiver end but is *ON* at the transmitter end the display shows "Aux Data: OFF", but will show the available PID of the transmitter Aux Data.
If the Aux Data has been turned *OFF* at the transmitter side but it's *ON* at the receiver side it shows "AuxData: ON", "PID: Not Found".

6.4 Setup Menu

This menu can be accessed from the Main Display by pressing the *CTRL* button twice then press the *ENTR* button. The flow chart of MVRD Setup Menu is shown in Figure 8. It consists of submenus described below.

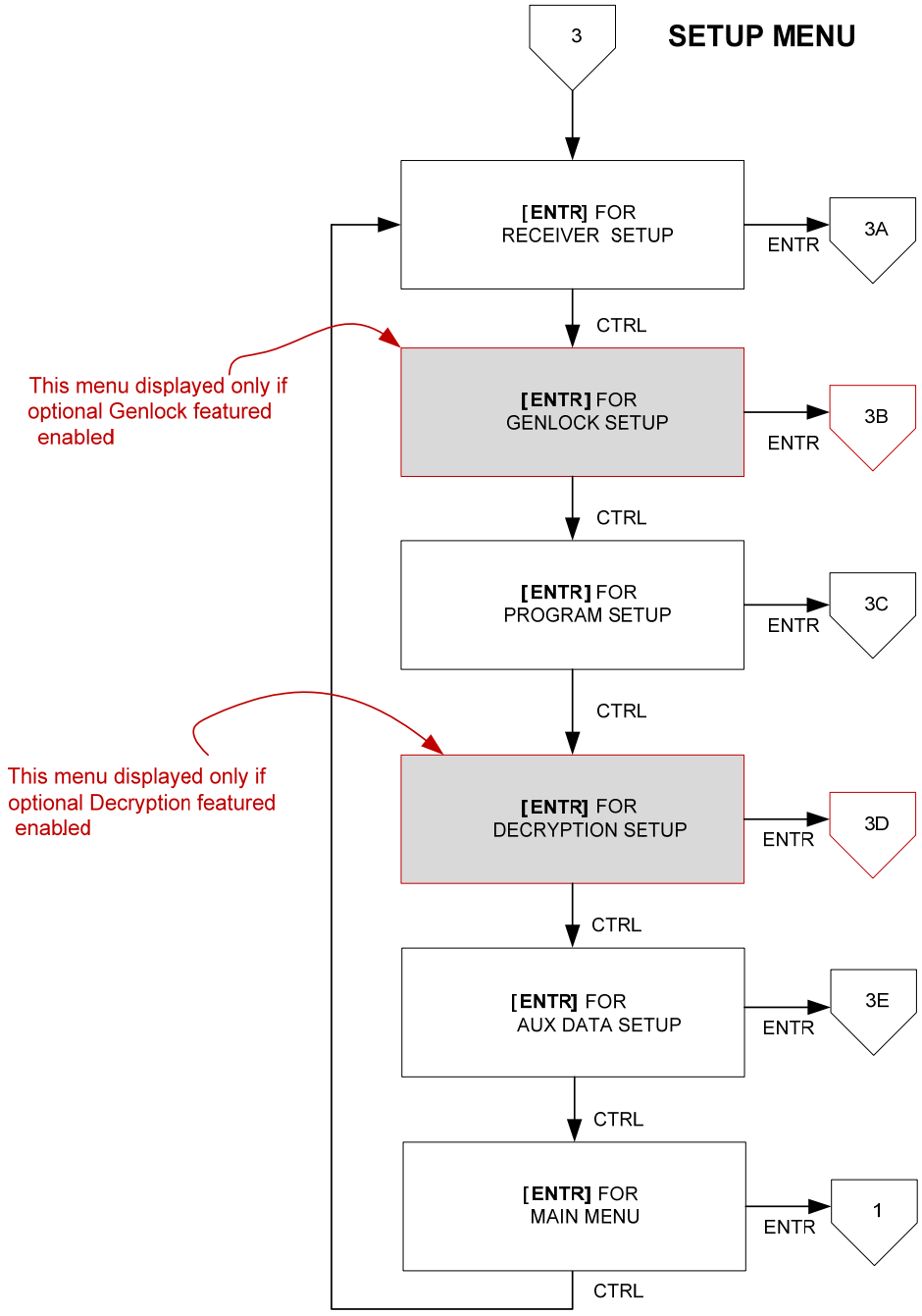


Figure 8 – Setup Menu

6.4.1 Receiver Setup

Flow chart for this submenu is shown in Figure 9. If the receiver is in *ASI Input mode*, the receiver submenus are skipped and the flowchart jumps to the Setup menu and then to the Main Menu.

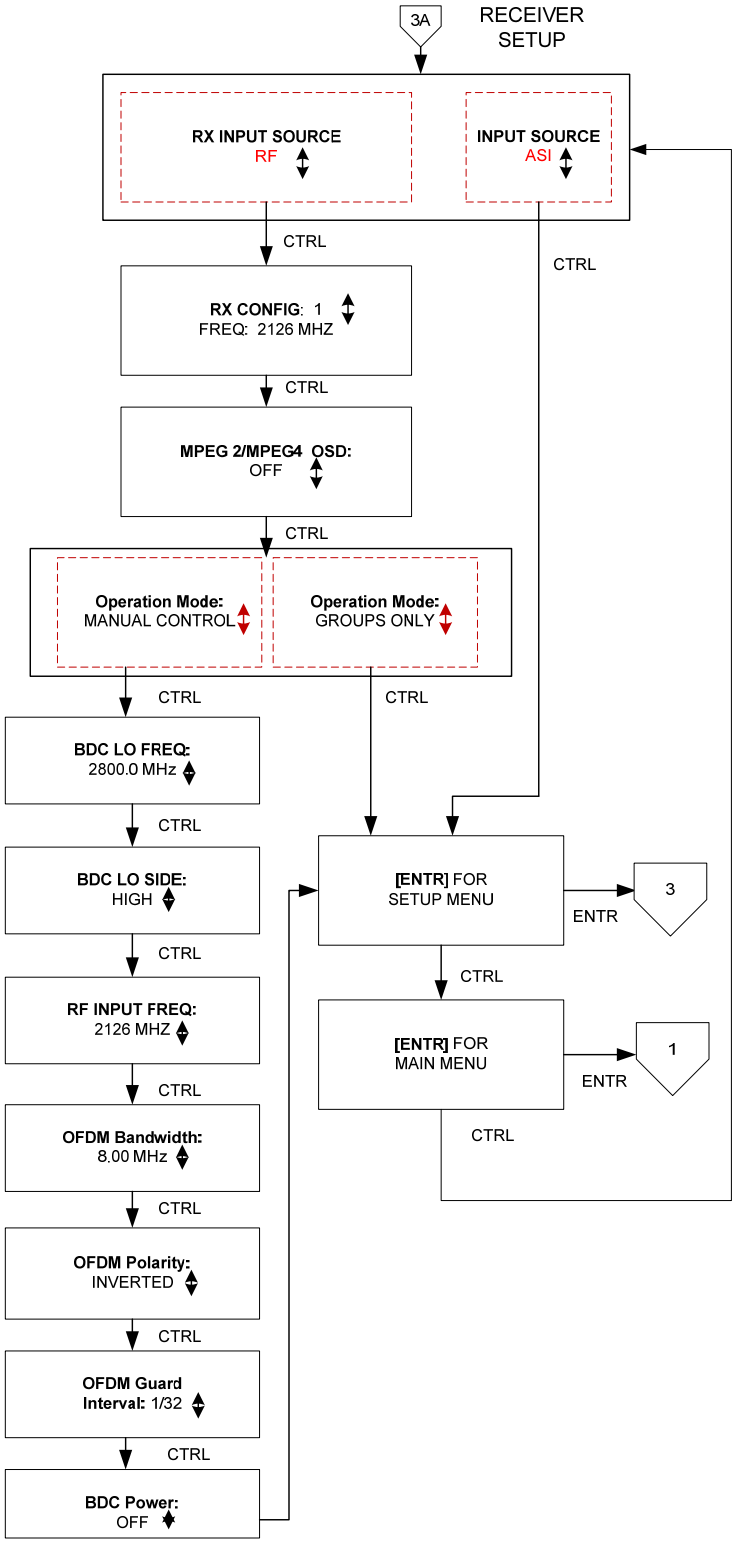


Figure 9 – Receiver Setup

6.4.1.1 RX Input Source

In this submenu the user can select the input mode – *RF or ASI In*.

R	X		I	n	p	u	t		S	o	u	r	c	e	:
A	S	I	↕												

6.4.1.2 RX Configuration

In this submenu the user can select from the Configuration Groups, 1 to 16. The change takes place only after pressing the *ENTR* key. The second line displays the frequency in MHz's. The RF frequency displayed here is the frequency associated with the configuration group shown. It cannot be changed from this screen. The RF frequency can be changed when in manual mode only, see section 6.4.1.4 below.

R	X		C	o	n	f	i	g	:		1	2	↕		
F	r	e	q	:		2	3	7	5	.	0	M	H	z	

6.4.1.3 OSD Control

This screen is only applicable when in MPEG2 or MPEG4 (Narrow Band Mode). On-Screen Display (OSD) shows the RF reception status with the composite video signal when the system is processing MPEG2 video. It allows the user to select *OFF*, *On Spectrum A* or *On Spectrum B* by toggling ↓↑ buttons. *Enter* saves the selection.

M	P	E	G	2	/	M	P	E	G	4		O	S	D	:
O	N		(	S	P	E	C	T	R	U	M		A	)	↕

6.4.1.4 Operation Mode

In this mode the user can select *Groups Only* or *Manual Control using* the UP ↑ and Down ↓ arrows If *Groups Only* is selected, then the control is returned to the *Setup Menu*.
If the unit is set into *Manual Control* Mode, then the user has an option to change the following parameters:

- ***BDC LO Freq:*** – This allows definition of the Local Oscillator Frequency of the BDC-s.
- ***BDC LO Side:*** **–** This field allows definition of the local oscillator side. Values are either *HIGH* or *LOW* side injection. High side injection means the LO is at a higher frequency than the RF. So if 'RF freq' – 'LO freq' = IF freq, then the IF Freq will be negative, the spectrum is inverted. The opposite is true for LOW side injection. Selection of these values depends on the BDC-s used. They will vary depending on manufacturer.
- ***RF Input Freq:*** – RF input frequency at BDC (block down converter) input. The receive frequency can be changed by entering the new desired frequency in this field. In this

submenu the user can change the RF Frequency in 0.1 MHz steps. Pressing ENTR saves the frequency in the current configuration.

- OFDM Bandwidth: – This field displays the bandwidth of the received OFDM signal. It should be set to the same bandwidth of the transmitter selected from the following values: *6, 7 or 8 MHz* or with optional narrow bands *1.25* or *2.5MHz.*
- ***OFDM Polarity:*** **–** This field displays whether the OFDM signal is set to *Normal* or *Inverted Spectrum*.
- ***OFDM Guard:*** – User selects the guard interval which matches the transmitter. Guard interval sizes are selected from the following values *1/32, 1/16, 1/8 or ¼. When in narrow band (1.25 or 2.5 MHz) guard intervals are limited to either 1/16 or 1/8.*
- ***BDC Power:*** – This field determines if DC power is supplied to the BDC-s via the IF Cable. Values are *ON* or *OFF*. Caution: Make sure that the IF cable is not shorted prior to enabling DC power.

6.4.2 Genlock Setup

☛ This is an optional feature and may not be available in all units; reference Figure 10.

6.4.2.1 AVC Genlock On/Off

The first display presents the user with the options to turn Genlock *ON, OFF* or to *AUTO*. If the selection is *ON* and there is no reference signal or incorrect reference on the SYNC input (see section 5.2.10) the red error LED on the front panel lights. Otherwise, if the reference is correct the green LOCK LED on the front panel lights. The Genlock is disabled regardless of type of the reference signal on the SYNC input if the mode is set to *OFF*. In *AUTO* mode Genlock automatically locks if there is a reference signal on the SYNC in which it can lock to.

6.4.2.2 Genlock Offset

The next two displays are available only if Genlock is set to *ON* or *AUTO*. They provide the user with an option of adjusting the Genlock signal offset in terms of pixels or lines. The number of pixels or lines is determined by the type of reference signal on the SYNC input.

The remaining displays allows the user to either return to the MAIN menu or to the SETUP menu. Once Genlock has been setup it can be monitored in the STATUS menu, see section 6.3. The

STATUS menu Genlock screen shows if Genlock is locked, if it is *ON*, *OFF*, or in *AUTO* mode, if a reference signal is present (and the format), and the output video format the decoder is decoding.

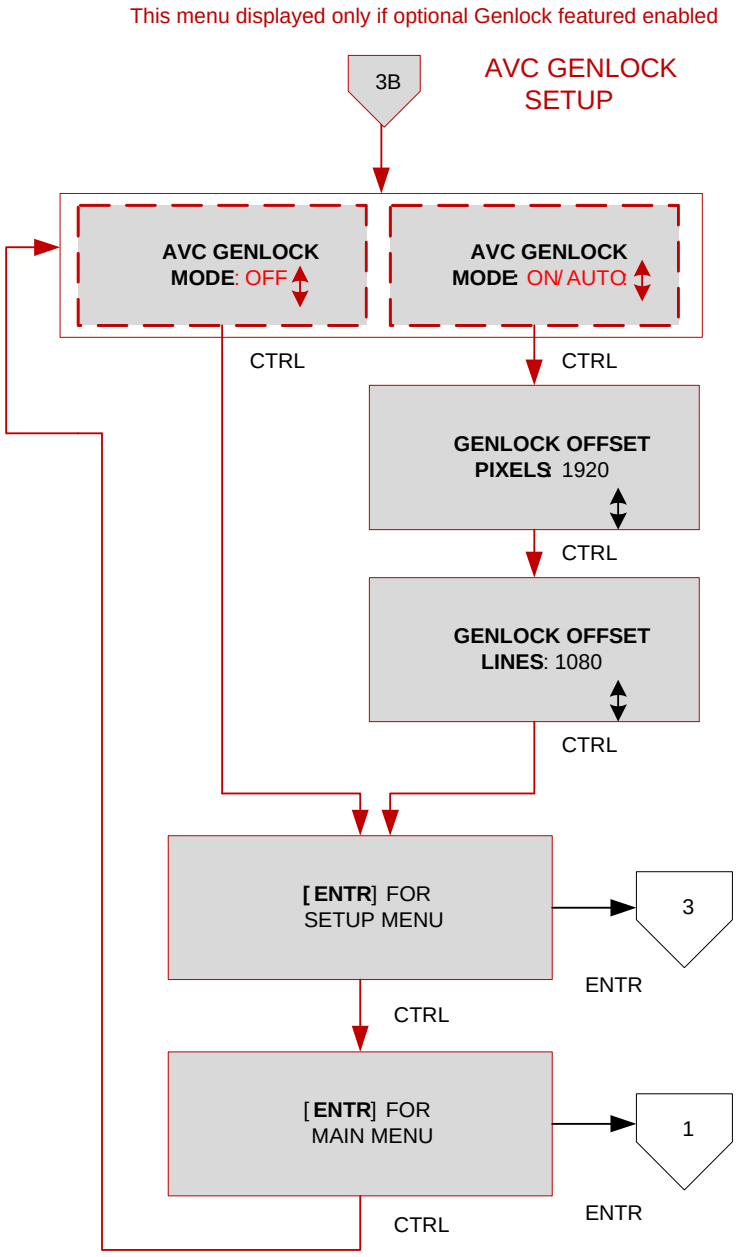


Figure 10 Genlock Setup Menu

6.4.3 Program Setup

The *PROGRAM* menu (reference Figure 11) allows the user to choose *AUTO* or *MANUAL* mode detection. If decoding a multi-program stream then MANUAL mode offers the user the ability to choose the program to be decoded. For a TS with a single program AUTO mode is recommended. If the Transport Stream has multiple programs and the unit is in AUTO mode, then the first program detected (from the PAT table) is decoded.

6.4.3.1 AVC Program

The flow chart of the Program Setup submenu is shown in Figure 11. Pressing *ENTR* takes the user to the following screen:

A	V	C		P	r	o	g	r	a	m				
M	o	d	e	:		M	A	N	U	A	L	↕		

The user can change the Program Mode from this screen.
The next screen is only available in Manual mode. It displays the selected Program number and a message if the decoder is not locked.

M	a	n	u	a	l		P	r	o	g	a	m	:		
				1	↕		N	O	T		A	V	A	I	L

☛Note: If the unit is power cycled and it was previously set for MANUAL program detection it remembers the specific program number it was decoding. Hence if for some reason that particular program number is no longer present then another program number needs to be selected from the "MANUAL PROGRAM" display in order for decoding to continue.

6.4.3.2 Selected Program

Selected program submenu contains information about the following PIDs: PCR, Video, Audio and PMT. These items are displayed one line at the time and are continuously cycled until the CTRL key is pressed. The next display allows the user to return to the beginning of the Setup Menu or the following screen allows a return to the Main menu.

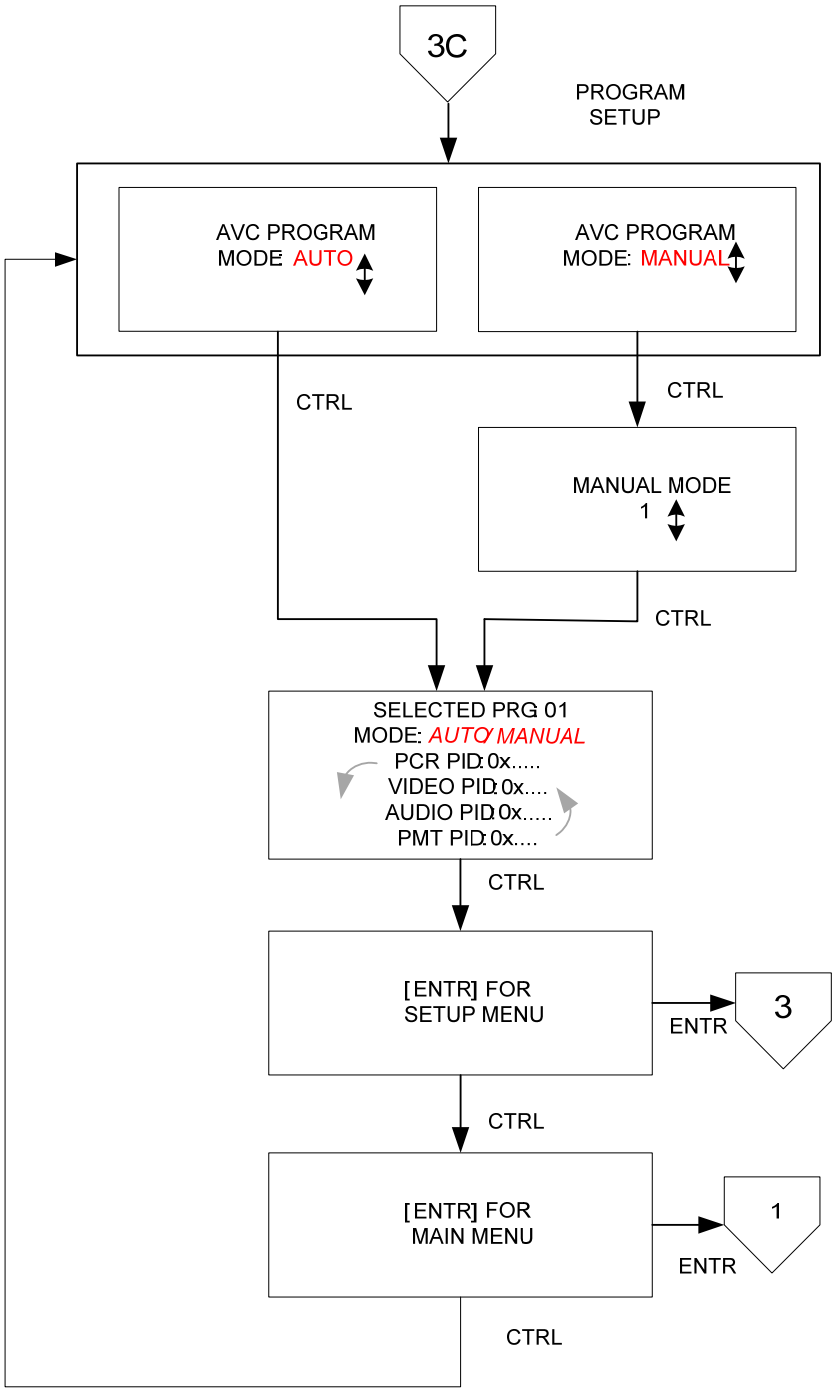


Figure 11 Program Setup Menu

6.4.4 Decryption Setup

☛ Note: This is an optional purchased feature (with the exception of ABS decryption type which is provided) and may not be available in all units.

6.4.4.1 Decryption Mode

This screen (reference Figure 12) allows the user to turn decryption *OFF* or to select the decryption type. The following encryption algorithms are available along with the new AES-C modes.

- B-crypt 128
- B-crypt 128+
- B-crypt 256
- B-crypt 256+
- ABS
- AES 128
- AES128+
- AES256
- AES256+
- AES-C 128
- AES-C 256

Decryption can be classified into 3 types depending on the key size. ABS has 8 hexadecimal characters, 128 have 32 hexadecimal characters and 256 have 64 hexadecimal characters. The remaining two screens in this setup allow the user to return to the *SETUP MENU* or to the *MAIN MENU*.
Keep in mind a key needs to be set on the receiver end which must match the transmitter key before the receiver is able to decrypt the encrypted transport stream. Setting the key can only be done using the LAN GUI WEB (under *the System Setup\Decryption* menu) interface; reference section 7.3 on how to enter a key. The key is automatically stored and is remembered on the next power cycle of the receiver.

Note: The B-crypt decryption algorithms sales are restricted. Contact factory for details.

This menu displayed only if optional Decryption featured enabled

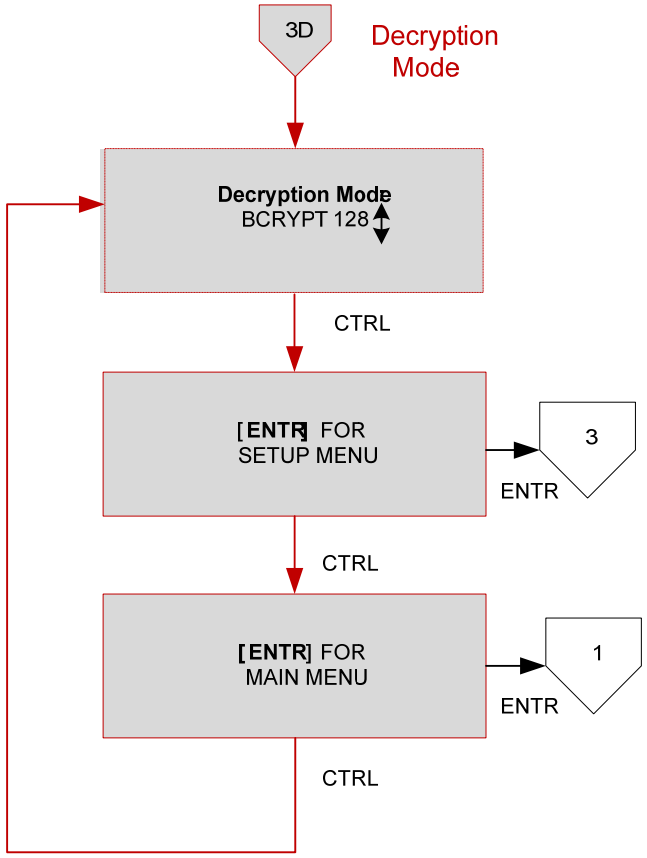


Figure 12 Decryption Setup Menu

6.4.5 Auxiliary Data

6.4.5.1 Aux Data Setup (reference Figure 13)

This screen allows Aux Data to be turned *ON* or *OFF*. If set to *OFF* (at the MVRD receiver side) and at the transmitter end it has been turned *ON* the next screen shows it's set to *OFF* but it does display the PID of the Aux Data from the transmitter (indicating that the PID is available).

If Aux Data is set ON (at the MVRD receiver side) and at the transmitter end Aux Data is *ON* with data being transmitted then the next screen shows that the Aux Data is *ON* and it cycles through the various parameters; the PID number, the baud rate, the data bits, and the parity (also reference 6.3.7 regarding Aux Data).

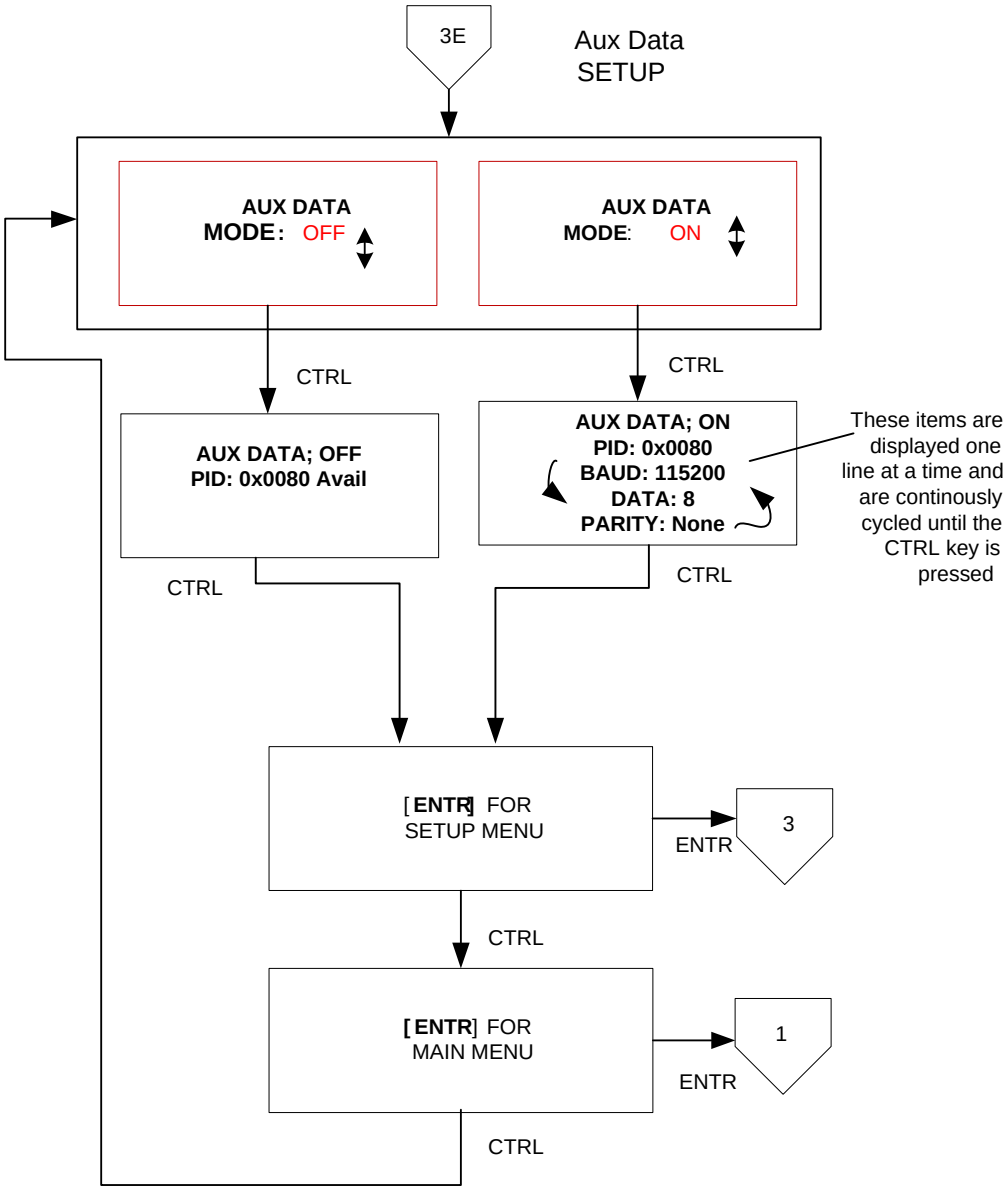


Figure 13 Aux Data Setup Menu

6.5 System Menu

The flow chart depicting the System Menu is shown in Figure 14. You enter this display from the Main menu, press the *CTRL* key three times and then the *ENTR* key. The System Menu displays the current *Network Setup*, the basic *receiver version(s), main board firmware versions*, *main board hardware version, main board serial number*, *model number and optional features enabled*. Most of the screens are self-explanatory.

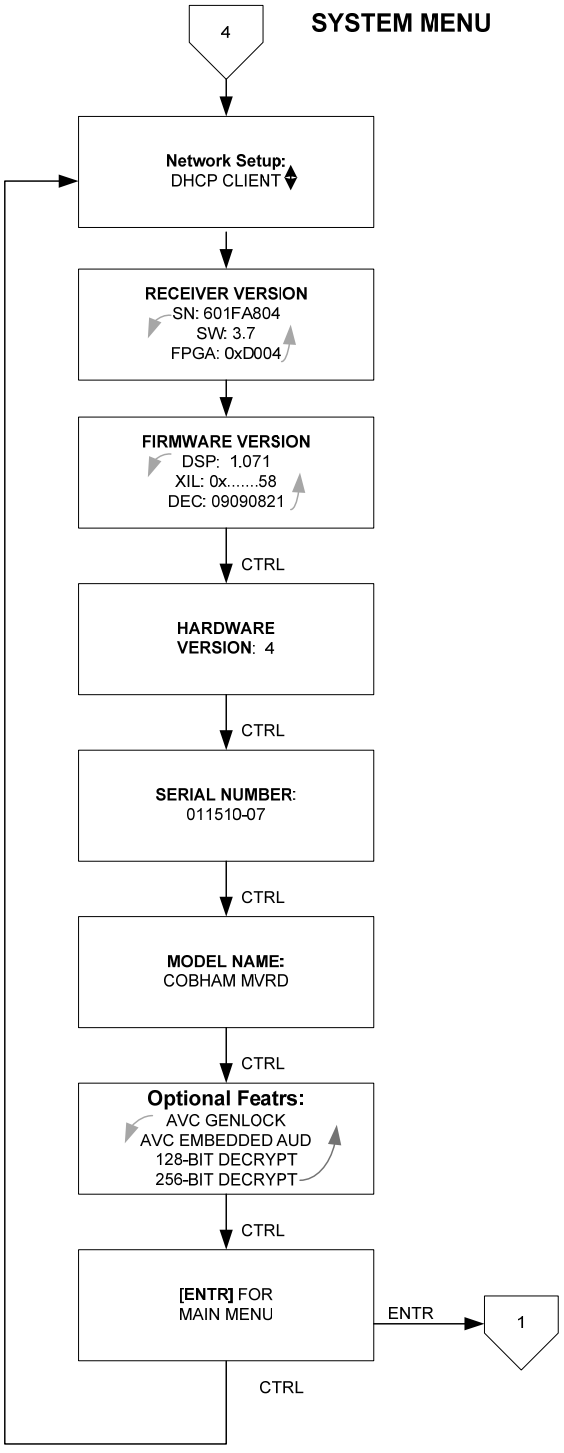


Figure 14 – System Menu

6.5.1 Network Setup

This Menu allows the user to choose either *DHCP* (Dynamic Host Configuration Protocol) *Client* or *STATIC* addressing. Assuming the server network to which the MVRD is attached provides DHCP services the DHCP server issues an address to the MVRD. The current assigned IP address can be found under the *STATUS MENU* (section 6.3) under the second screen.

With *DHCP Client* the MVRD Receiver/Decoder must be attached to a network which provides DHCP services for the address to appear otherwise *"0.0.0.0"* is displayed. Once the address is known, an Internet Browser can be used to communicate with the MVRD for using the WEB LAN GUI, updating new firmware, changing address configuration, entering codes to enable new features, etc.

If *STATIC* addressing is used the MVRD is initially shipped with a default static address of 192.168.1.135 (current assigned address can be found under the STATUS MENU in 6.3.3). In order to change the default address you need to note the current default IP address and then enter it into an internet browser such as Microsoft IE 9 or Firefox address text box. Once the LAN GUI opens the address and other parameters can be changed under the Network Configuration page.

6.5.2 Receiver Version

This screen displays the following information: *serial number*, *FW version* and *FPGA version* of the receiver portion of the MVRD. The versions are displayed on the second line and continuously cycled until CTRL key is pressed.

R	e	c	e	i	v	e	r		V	e	r	s	i	o	n
F	P	G	A	:	0	x	D	0	0	4					

6.5.3 FW Version

The next screen shows the FW version of the digital portion of the MVRD and contains firmware versions labeled *DSP*, *Xil*, and *Dec*. The firmware versions are displayed on the second line one at a time (briefly) and the versions are continuously cycled until the CTRL key is pressed.

F	i	r	m	w	a	r	e		V	e	r	s	i	o	n
D	S	P		1	.	1	0	1							

6.5.4 Hardware Version

This screen displays the hardware version of the main board.

6.5.5 Serial Number

This screen displays the serial number of the main board.

6.5.6 Model Number

The model number is MVRD.

6.5.7 Optional Features

Labeled “Optional Featrs” this screen displays the enabled features.

7. LAN GUI WEB INTERFACE

- *With the latest firmware release there is now a user friendly LAN GUI WEB interface. With a PC attached (using an IP cable) the LAN GUI can be easily opened (using a browser such as Microsoft IE 9 or FireFox) at any time by just entering its IP address into the browser's address bar (text box). The LAN GUI pretty much functions as the font LCD panel with a few additional features. Note that the MVRD receiver/decoder leaves the factory with a Static IP address of 192.168.1.35. It can be changed using the LAN GUI.*

7.1 Main Menu Page

- Enter the IP address of the decoder into a browser search box and press the ENTER key. The opening screen of the server is displayed. Click on the "Continue" button, the *Windows Security* window opens, see Figure 15. Enter the *User Name* and *Password*; initial credentials are **admin**, **admin** which can be changed later using the *Update Logon menu under the System Setup* and then click on the "OK" button. The main page opens, see Figure 16.

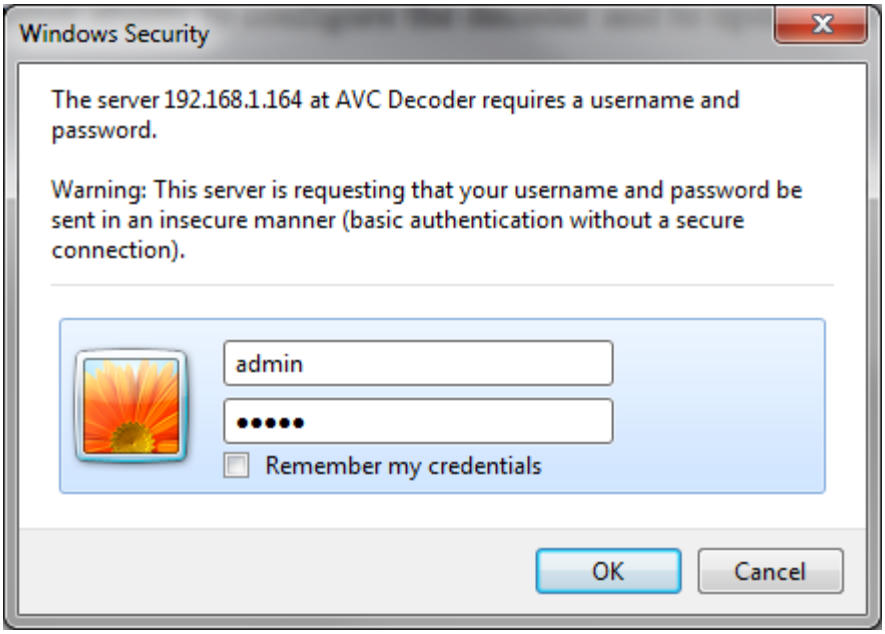

Windows Security
The server 192.168.1.164 at AVC Decoder requires a username and password.
Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).
admin
Remember my credentials
OK
Cancel

Figure 15 Windows Security

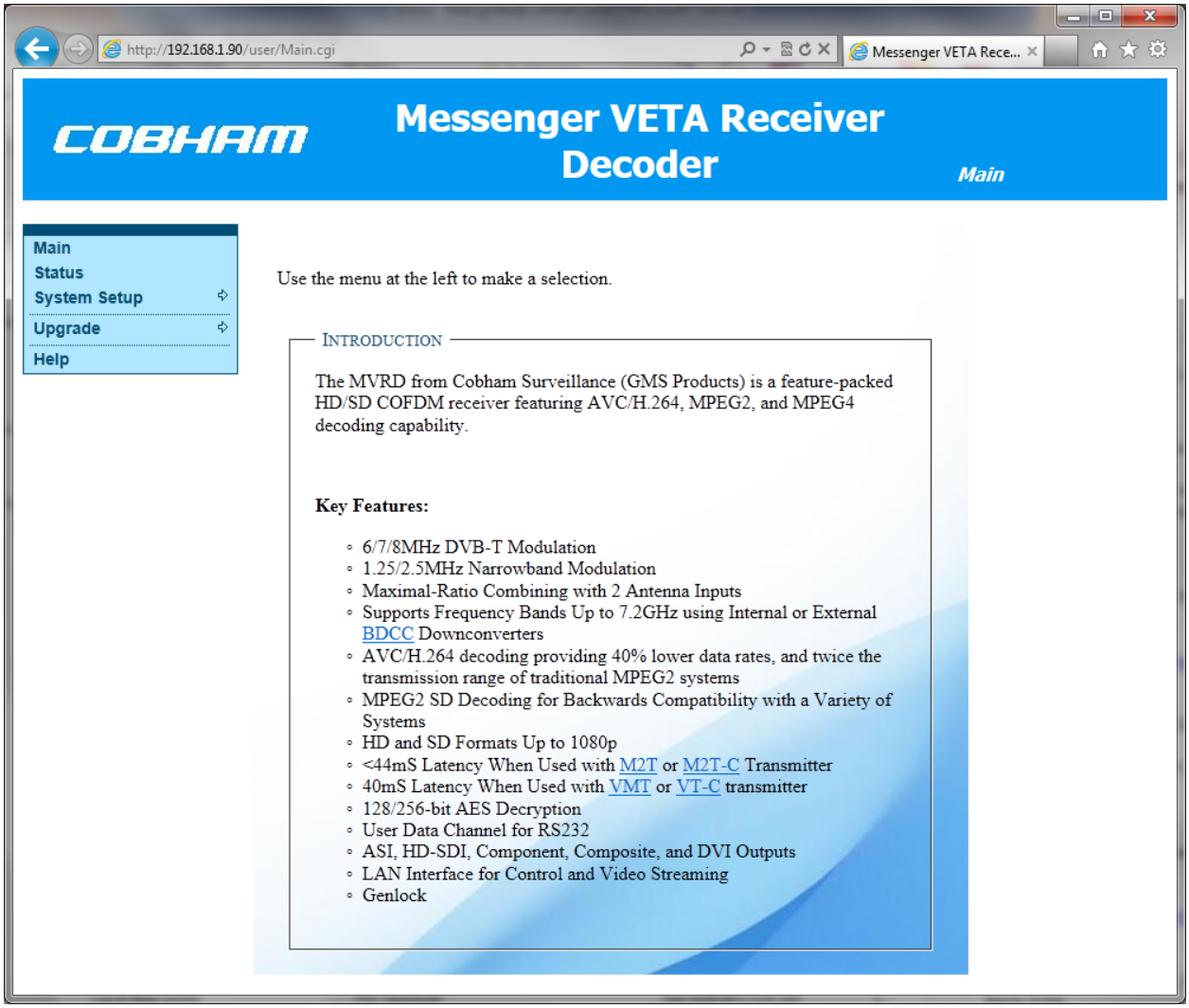

http://192.168.1.90/user/Main.cgi
Messenger VETA Rece...
COBHAM
Messenger VETA Receiver Decoder
Main
Main
Status
System Setup
Upgrade
Help
Use the menu at the left to make a selection.
INTRODUCTION
The MVRD from Cobham Surveillance (GMS Products) is a feature-packed HD/SD COFDM receiver featuring AVC/H.264, MPEG2, and MPEG4 decoding capability.
Key Features:
6/7/8MHz DVB-T Modulation
1.25/2.5MHz Narrowband Modulation
Maximal-Ratio Combining with 2 Antenna Inputs
Supports Frequency Bands Up to 7.2GHz using Internal or External BDCC Downconverters
AVC/H.264 decoding providing 40% lower data rates, and twice the transmission range of traditional MPEG2 systems
MPEG2 SD Decoding for Backwards Compatibility with a Variety of Systems
HD and SD Formats Up to 1080p
<44mS Latency When Used with M2T or M2T-C Transmitter
40mS Latency When Used with VMT or VT-C transmitter
128/256-bit AES Decryption
User Data Channel for RS232
ASI, HD-SDI, Component, Composite, and DVI Outputs
LAN Interface for Control and Video Streaming
Genlock

Figure 16 Main Page

- The main menu to the left of the screen consists of *Main*, *Status*, *System Setup*, *Upgrade* and *Help* (see the above figure). The main menu is always displayed (to the left of the screen) regardless of which submenu page is currently displayed.
- The Main page provides an introduction of the key features.

7.2 Status Menu Page

- The Status menu page shows the status of the receiver/decoder, see Figure 17. The page is not refreshed automatically; you can force the refresh rate by clicking on the "*Start Refresh*" pull down box and select the refresh time form 1 second to 10 seconds or leave the default of *only*

Once, in which case you need to click on the "*Start Refresh*" button each time an update refresh is needed.

☞ *It is always a good idea to click on the "**Refresh**" button when first entering any setup page to ensure the information you're looking at is current.*

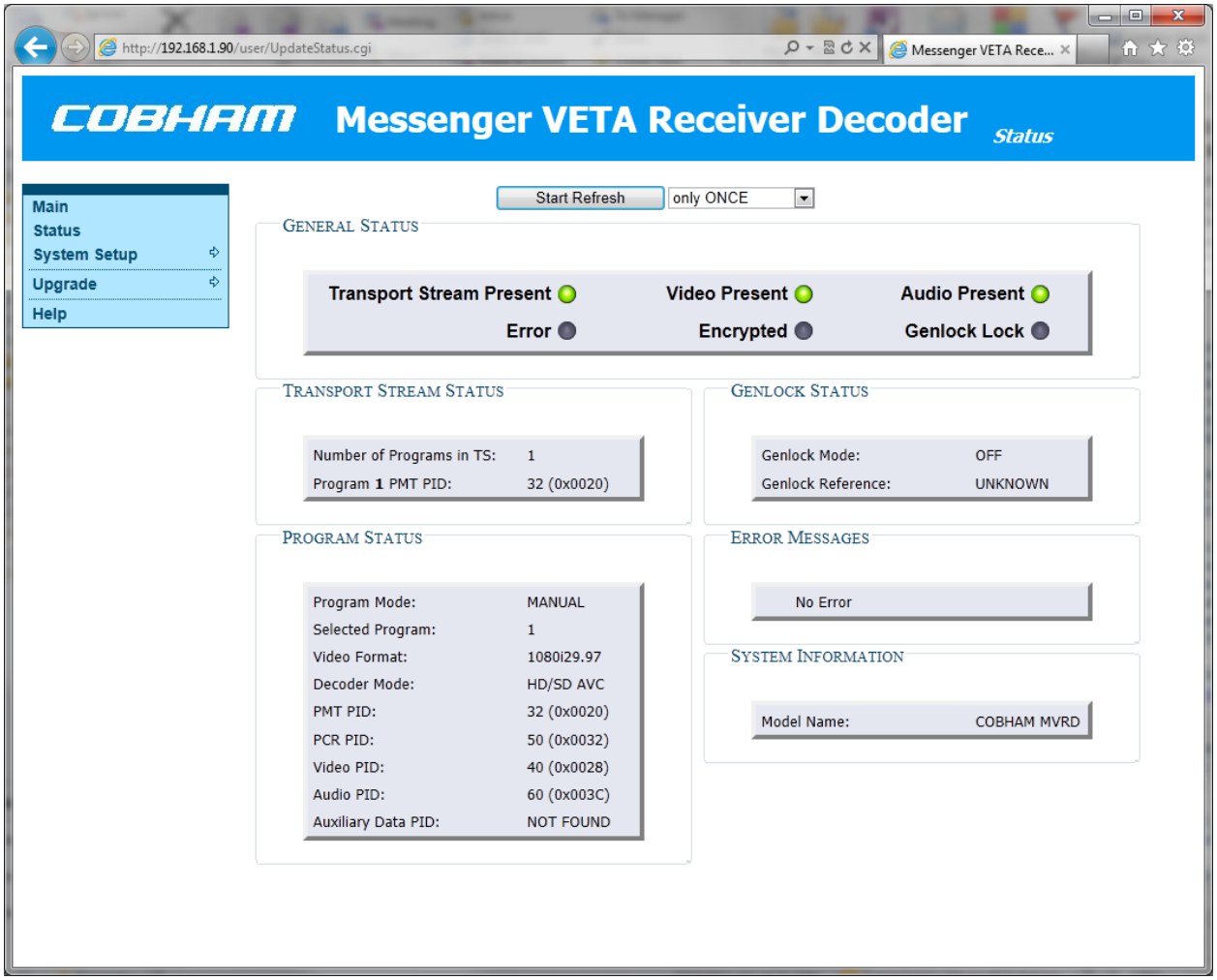


Figure 17 Status Menu Page

- The Status page is divided into several sections:
    - The ***General Status*** consists of the *Transport Stream Present*, *Video Present*, *Audio Present*, *Error*, *Encrypted* and *Genlock Lock* statuses. A green circle next to that particular item (for the *Transport Stream Present, Video Present, & Audio Present*) indicates that the item is present. A red circle indicates the item is not present for the three items mentioned above. A red circle next to the *Error* indicator indicates an error condition, if this is the case you should look at the ***Error Messages*** section on this same page for a description of the error. A yellow circle next the Encrypted indicator

indicates an encrypted transport stream is present. A red circle next to the Genlock indicator indicates it has been activated but is not able to lock, a yellow circle indicates Genlock is in auto mode, a green circle indicates it has been activated and is in a locked condition.

- ***Transport Stream Status*** shows the number of programs in the TS and the PID numbers of the program.
- **The *Program Status*** provides general information regarding the program such as the selected program, the video format, the decoder mode and the PID information for each item in the program.
- The ***System Information*** gives basic receiver/decoder model information (in this case it shows COBHAM MVRD).
- The ***Error Messages*** gives a basic message regarding the error condition (if truly an error). Not receiving a Transport Stream in which case the *Transport Stream Present*, the *Video Present* and *Audio Present* all show a red circle could indicate that no signal has been connected to the ASI IN connector on the rear of the unit; this is not really an error condition.
- The ***Genlock Status*** shows the Genlock mode and the Genlock Reference it's locked to.

7.3 System Setup

Keep in mind most of the System Setup pages described below can be implemented from the from the front local control panel (see section 6.4). However there are a few exceptions such as entering a key when using decryption, entering a new Static IP address, and setting up LAN Streaming. In general the GUI LAN WEB interface offers a quick user friendly way of selecting various parameters and monitoring the receiver/decoder using the Status Page.

7.3.1 Input Page

- The Input page (reference Figure 18) consists of two sections; the *Transport Stream Input Source Selection* and the *Program Selection*. The Transport Steam Input Source Selection allows a choice of **ASI**, **RF or LAN**. The MVRD has the capability of switching between an **RF** (radio frequency) an **ASI** (asynchronous serial interface) or a stream from the **LAN** input.

RF INPUT

- When **RF (**which is the default mode) is selected then the corresponding RF parameters must be set correctly. These can be addressed through the front local control panel (see section 6.4.1) or by using the LAN GUI interface under ***Receiver*** (this is described later in section 7.3.7). Ensure to click on the "*Apply*" button for the input mode to take effect.

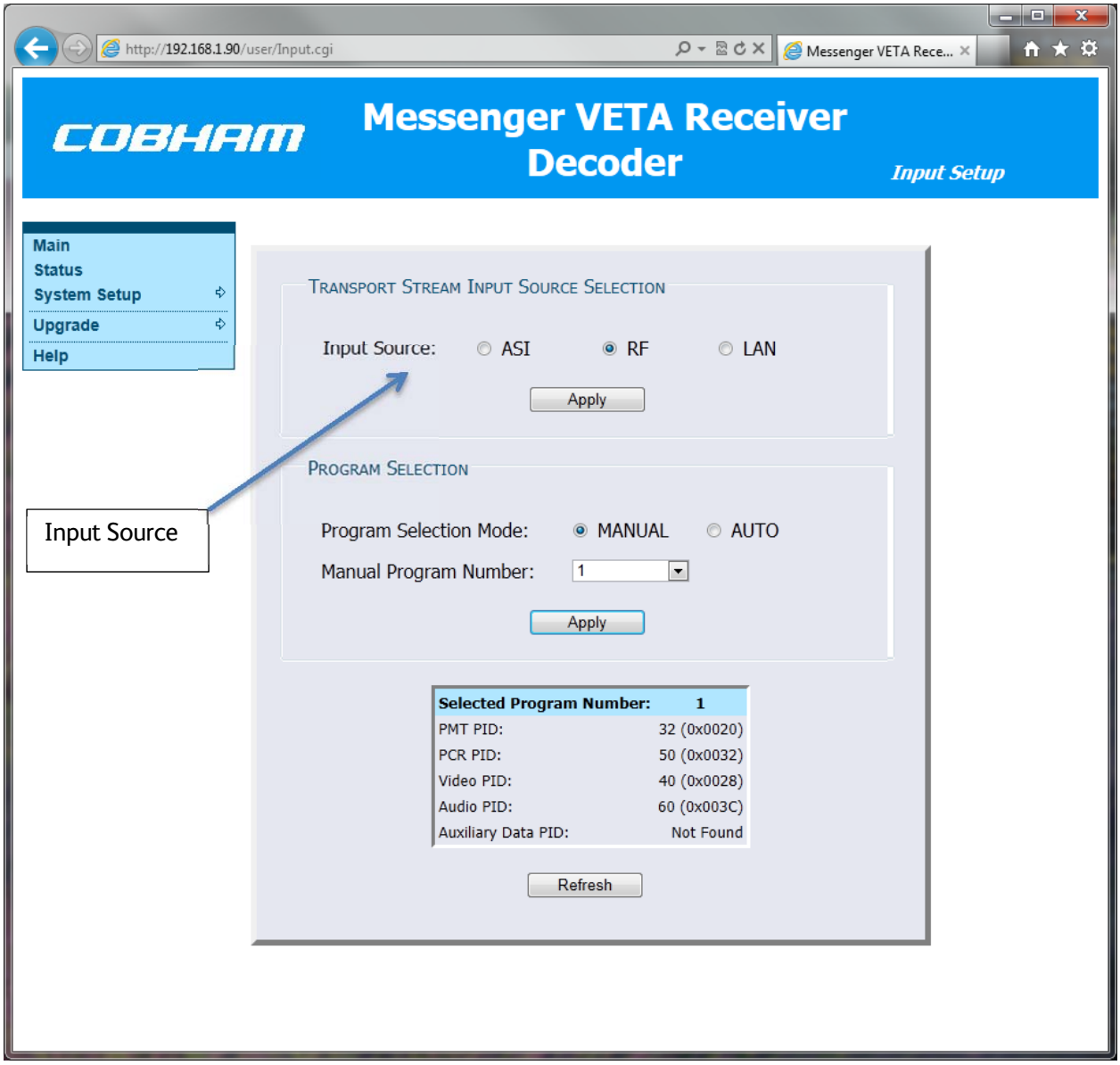


Figure 18 Input Setup

- ***The Program Selection*** (which is the second part of this page) allows the user to choose between "**Auto**" or "***Manual***" mode. These modes were previously explained in 6.4.3; in short when in the *Manual* mode the user must select between the various programs when decoding multi-programs whereas in the *Auto* mode the decoder starts decoding the first program detected in the PAT table. The *Selected Program Number* of the decoded program is displayed in the lower portion of the screen along with the PID numbers of the PMT, PCR, Video, Audio and Aux Data.

ASI INPUT Source

- If the *ASI* input is selected then the decoder expects an ASI Stream with a transport stream. The *RF* input and the *LAN* input are turned OFF automatically. ASI input streams cannot exceed 30 Mbps. The setup page for the *ASI input* is the same as when the *RF input* is selected (see Figure 18 above) only the radio button selection changes. The *Program Selection Mode* (auto or manual) as explained above still applies when the *ASI INPUT* Source is selected.

LAN INPUT Source

- If an *LAN* input source is selected the setup page changes to allow the user to enter the necessary parameters, the *IP Address* and the *Port Number*. Reference Figure 19 below. The IP address Configuration allows a Multicast address or the Device Default IP address (its own IP address) to be entered. In addition a Port Number must be entered. As stated above the *Program Selection Mode* (auto or manual) still applies here also. Note that if the output was previously set to LAN Streaming Out it will automatically be turned OFF once the LAN INPUT Source is selected. You cannot stream IN and OUT at the same time.

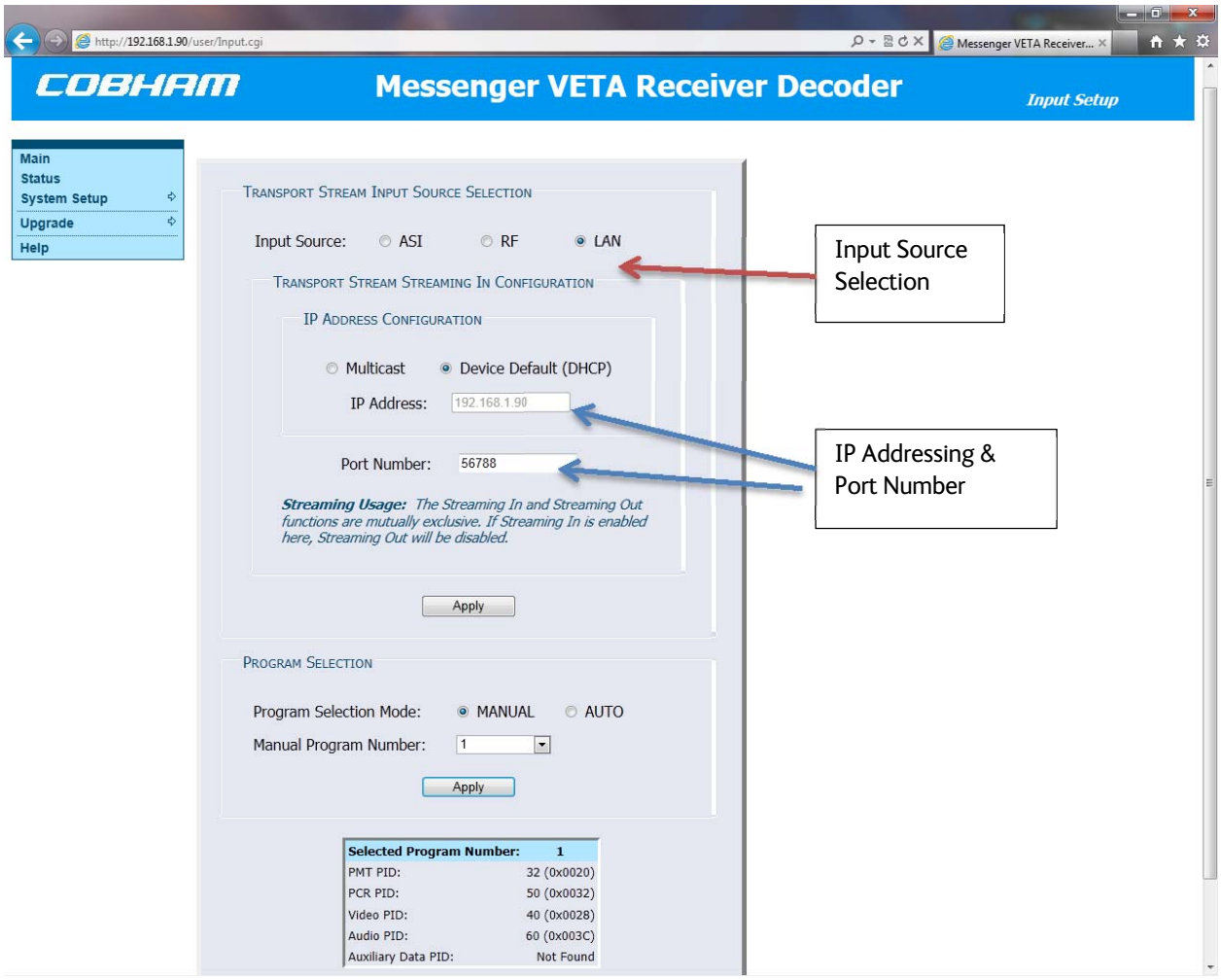


Figure 19 LAN INPUT Setup

7.3.2 Output

- The *Output* (reference Figure 21) page consists of two sections, the **ASI Out** and the ***Transport Stream Streaming Out***.
- The first section allows the user to enable the *ASI Output* which is basically an ASI feed through. If not enable there is no ASI out. By default the *ASI Out* is OFF.
- The *Transport Stream Streaming Out* allows the user to Stream over the LAN an output in a transport stream format. It essentially takes the current input which is either a RF input or an ASI input and streams the entire received transport stream over the LAN. The *Destination IP Address*, the *Destination Port Number* and the *Destination Protocol* must be entered or selected accordingly. Only IPv4 IP addressing is supported. In addition the supported protocols are either "*UDP/IP*" or "*RTP/UDP/IP*". Keep in mind you cannot select Streaming IN and Streaming OUT at the same time. If Streaming IN was selected and then Streaming OUT is selected the Streaming In is turned OFF and the input is automatically switched to ASI IN. Also ensure the device that is receiving the stream supports the protocols stated above.

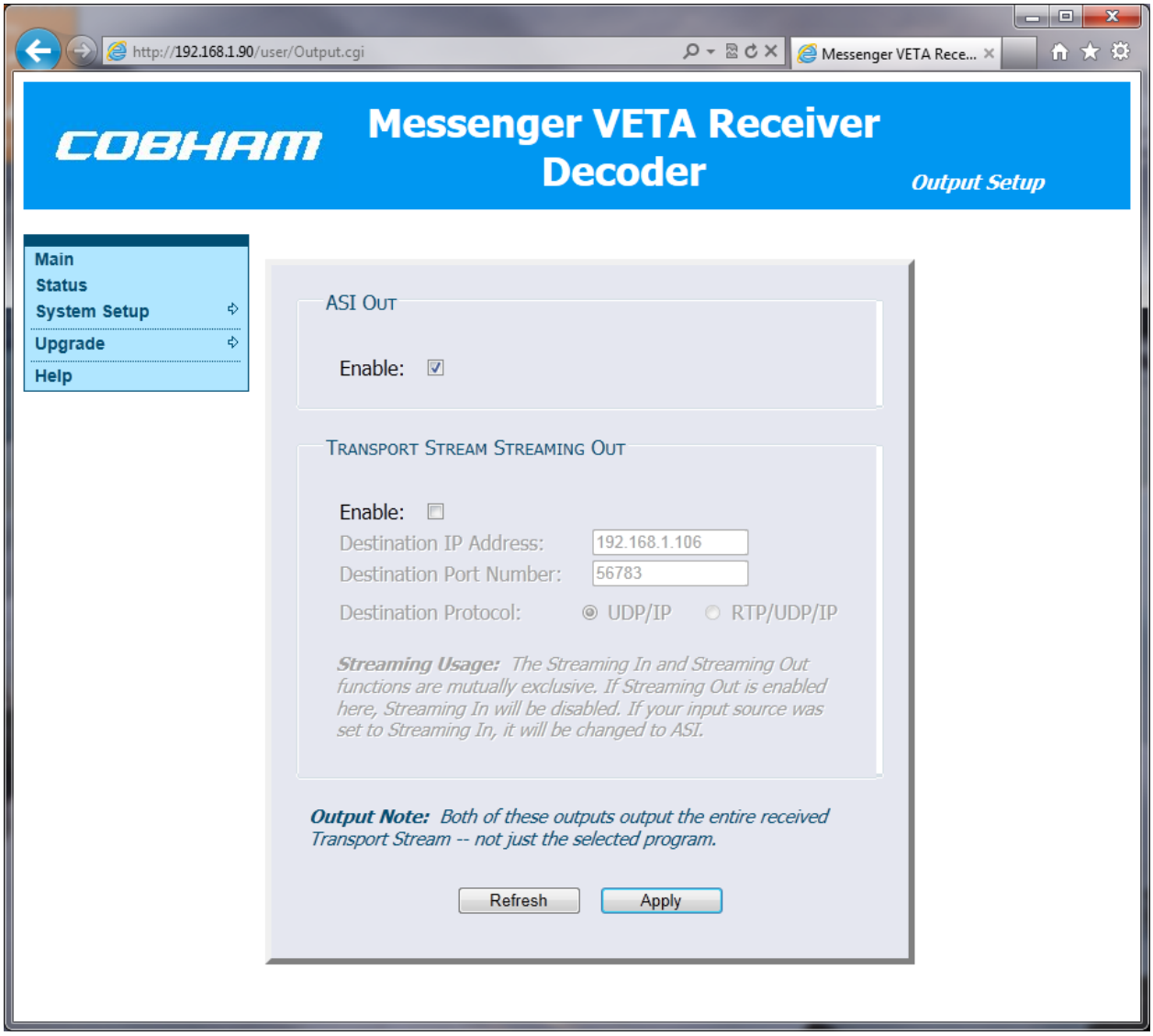


Figure 20 Output Setup

7.3.3 Genlock

- ***Genlock*** (reference Figure 19) page consists of two sections. The *Select Genlock Mode* and the *Configure Genlock Offsets*. The first section allows the user to turn it *ON*, *OFF* or place it in *AUTO* mode. Remember this is an optional purchased feature and may not be available on all units. Table 1 below summarizes the modes. Keep in mind that with Genlock ON (locked to a reference signal), it does add some latency (up to 1 frame) to the final output.
- Also as the table below shows the only difference between *Auto* and *ON* mode is when there is no reference signal attached to the Sync input. When in the *ON* mode the Status page Genlock Lock and Error indicator lights up with a red indicator (also the front Panel red LED lights up)

whereas when in the *Auto* mode the Genlock Lock indicator (on the Status page) lights up with a yellow indicator.

Mode	***Valid Genlock reference signal on Sync input (correct format)***	***Non-Valid Genlock reference signal on Sync input (incorrect format)***	***No reference signal on Genlock Sync input***	***Genlock Lock (indicator) on Status Page (GUI)***	***Front Panel Red Error LED***
Auto mode	✓	----------	----------	*Green*	*OFF*
Auto mode	----------	✓	----------	*Red*	*ON*
Auto mode	----------	----------	✓	*Yellow*	*OFF*
ON mode	✓	----------	----------	*Green*	*OFF*
ON mode	----------	✓	----------	*Red*	*ON*
ON mode	----------	----------	✓	*Red*	*ON*
OFF Mode	*n/a*	*n/a*	*n/a*	*Gray*	*OFF*

Table 1

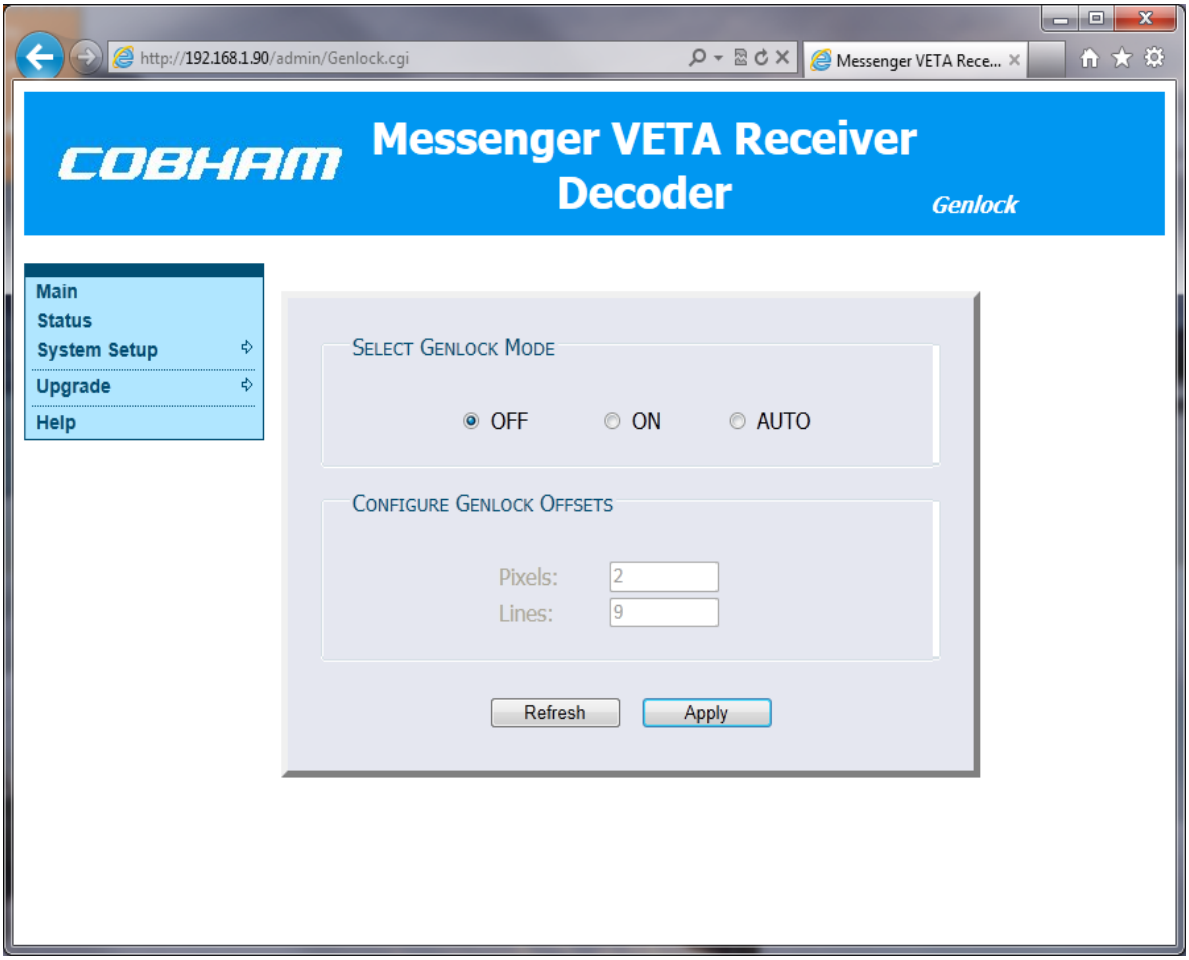


Figure 21 Genlock Setup

7.3.4 Decryption

- The *Decryption* page consists of the *Decryption Configuration* and the *Decryption Key Setup*, see Figure 22 below. The decryption type/mode can be selected from the "*Current Decryption Mode*" pull down box. This action can also be performed from the local control panel, see section 6.4.4.1 In the *Decryption Key Setup* the user can enter the *key* for the current decryption mode (the *key* must match the transmitter *key* for the corresponding encryption mode). The number of characters (hexadecimal 0-9, A-F) is limited depending on the decryption mode selected; *64* for a 256 mode, *32* for a 128 mode and *8* for ABS). If a 256 decryption mode is selected then the user must enter a 32 character lower *key* and a 32 character upper *key*. All other modes only require a lower *key*. The *key* is automatically stored and is remembered on the next power cycle.

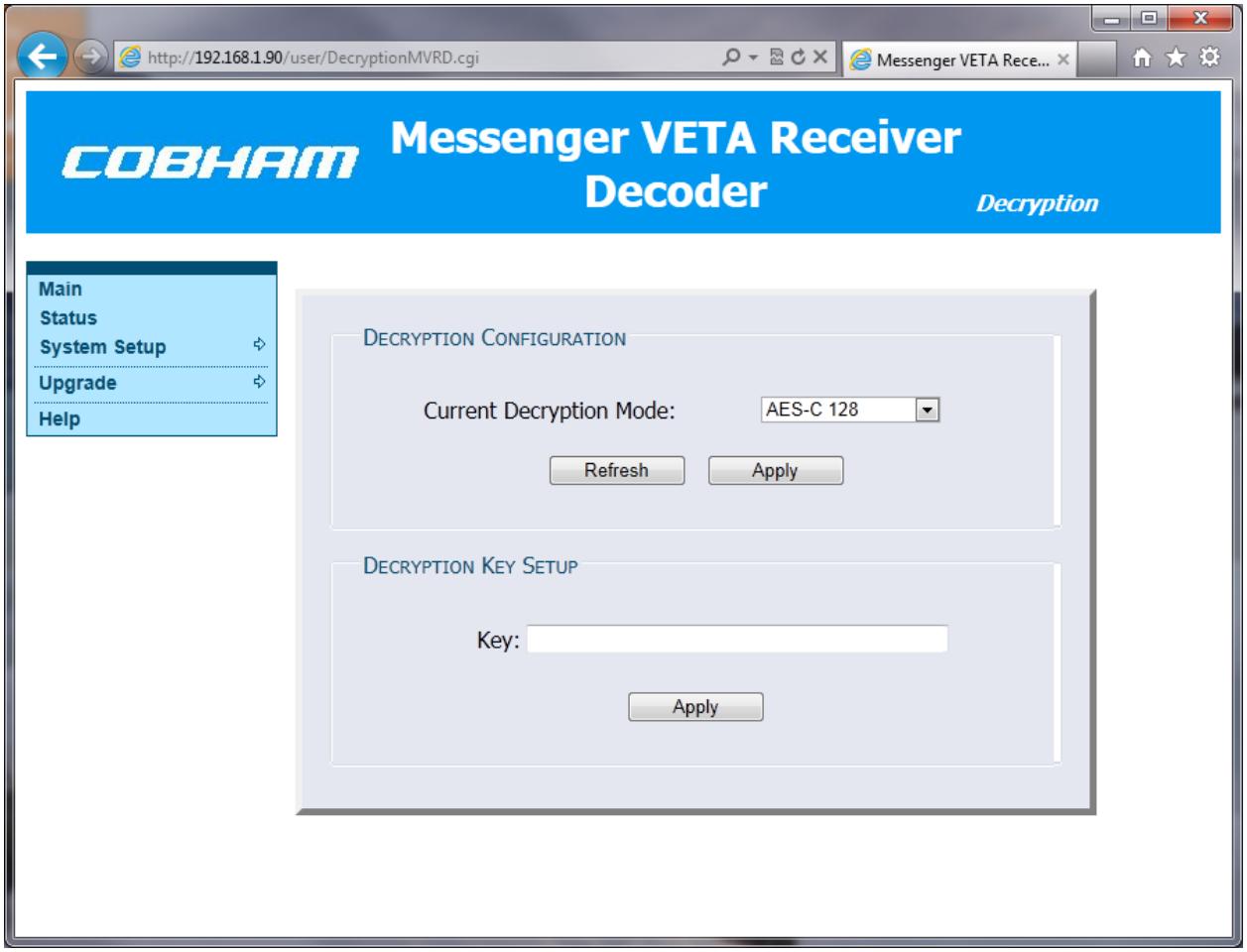


Figure 22 Decryption Setup

7.3.5 Auxiliary Data

- *Auxiliary Data* page (see Figure 23) allows the user to either set the data mode to *ON* or *OFF*. It operates as discussed in section 6.3.7. In short if *ON* and data is present at the transmitter end then auxiliary data information is displayed in this page; the information shown is the aux data PID number, the baud rate, the data bits and the parity.

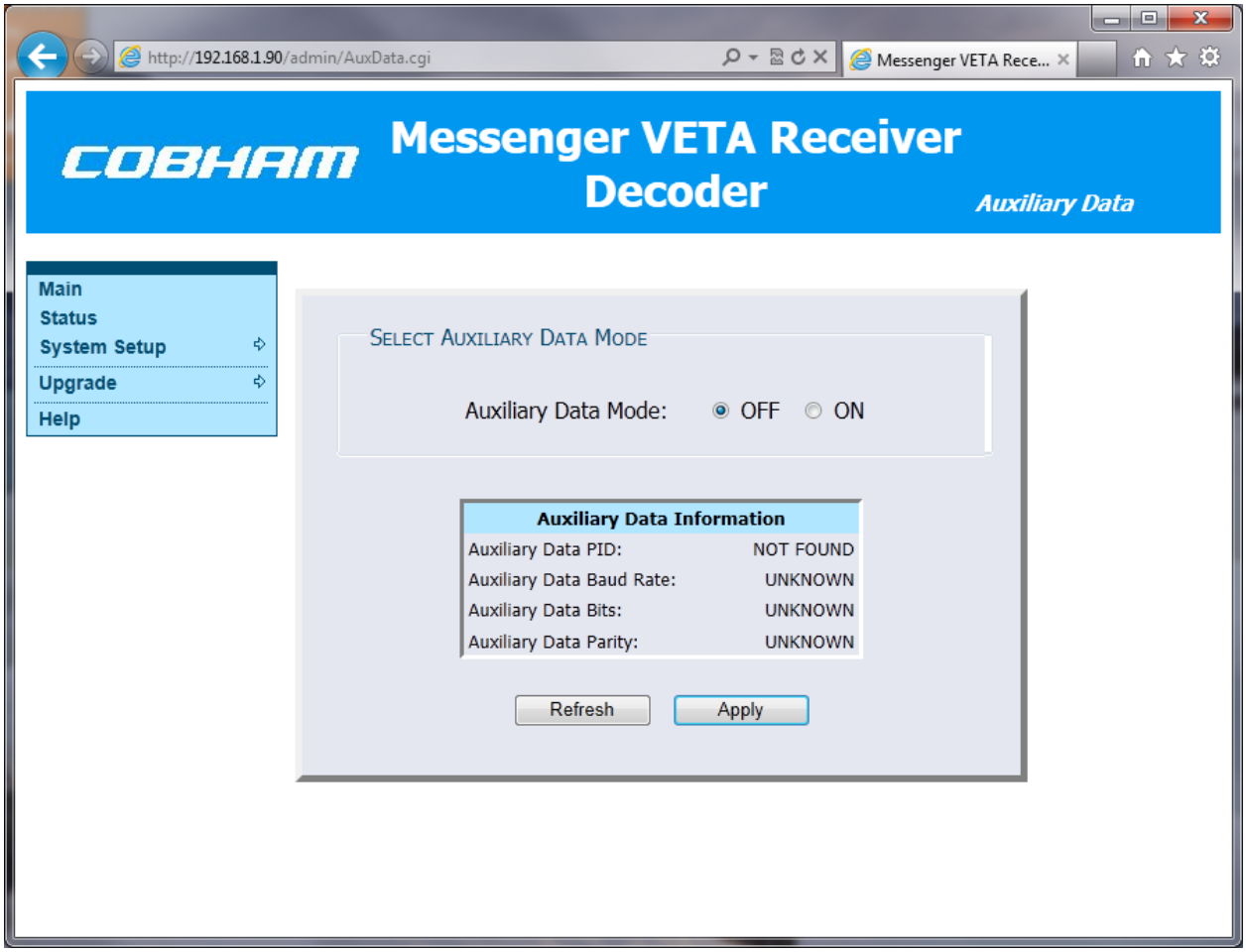


Figure 23 Auxiliary Data Setup

7.3.6 Network

- The *Network* page allows a selection between *Static* IP addressing or *DHCP*. This selection can also be done from the front local control panel, however if switching to Static the address must be entered using this LAN GUI WEB interface. As shown in Figure 24 the default is Static with a default address of *192.168.1.35*. If the receiver/decoder is going to be used on a network which has DHCP services then it may be better to select DHCP. Note that if set for DHCP and the IP address shows 0.0.0.0 from the front local control panel it could be because the unit *isn't* currently attached to a network with a DHCP server. In addition the *Subnet Mask*, *Default Gateway* and *Domain Name* can be entered; all located under the DHCP frame. Toward the bottom of the screen the *Domain Name Server* IP address along with the *Local Host Name* and the *Web Server Port* can also be entered.

  ☞ *Note that after switching or changing parameters on this page the Receiver/Decoder should be power cycled for the new changes to take place.*

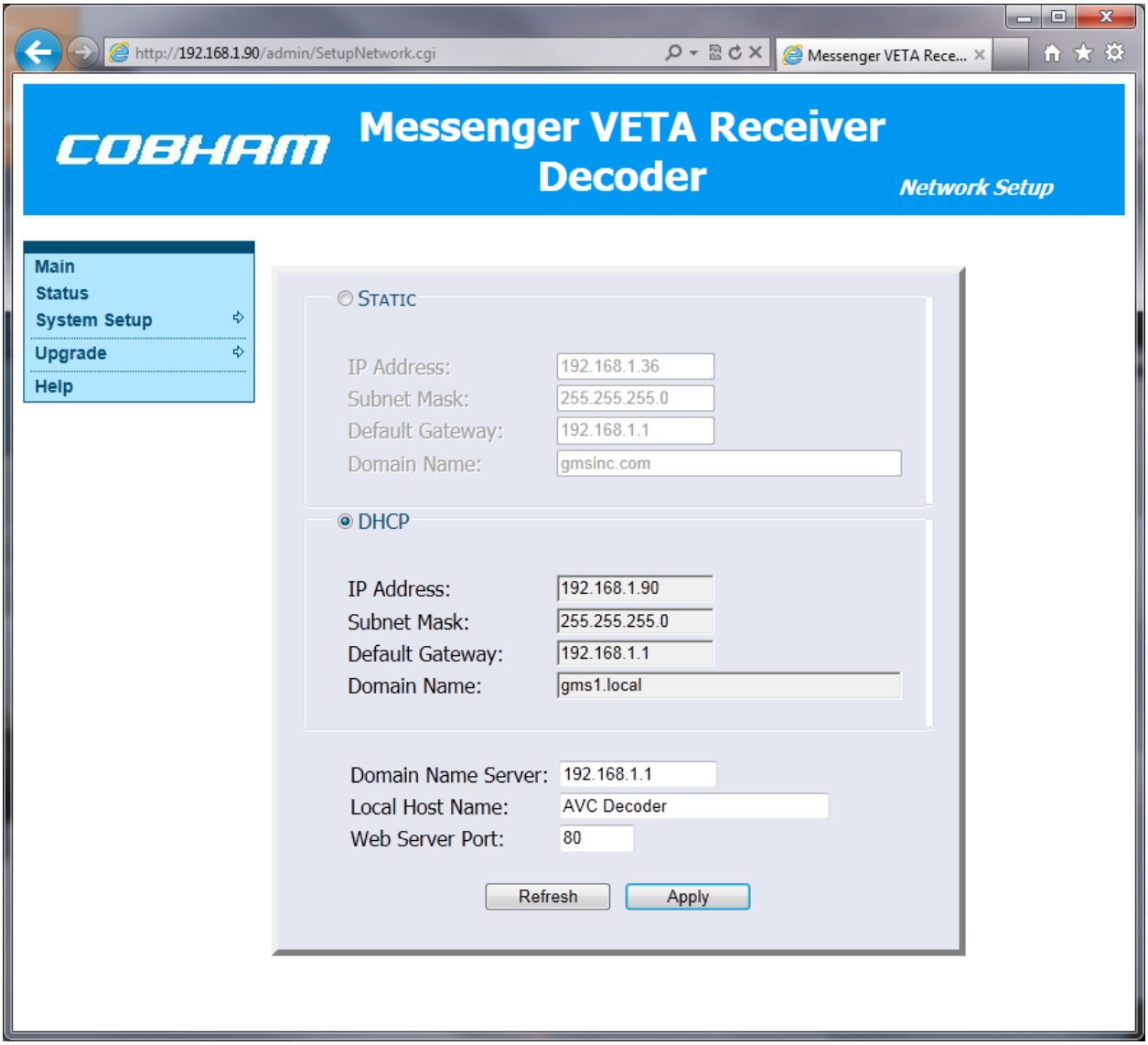


Figure 24 Network Setup

7.3.7 Receiver Configuration Mode Selection

- *Receiver* page.....consists of several parameters which have been described in section 6.4.1. Please reference that section as well as looking at the receiver page in Figure 25 before making changes. The user should be aware of the difference between *Groups Only* mode and *Manual* mode. If ***Groups Only*** is selected under the *Receiver Configuration Mode Selection* then it is assumed that the parameters under the *Groups Only Mode/Configuration Group* (active group number) have already been pre-configured and associated with a pre-defined group. Hence the

various parameters (as seen in Figure 25) under the active group number are grayed out. In this mode all the user has to do is to select a group number (1-16) from the *Configuration Group* pull down box which matches the transmitter setup group setup. If the user selects ***Manual*** mode then the various parameters under the active group number (which will no longer be grayed out) can be changed to reflect the transmitter setup parameters, see Figure 26. After the "Apply" button is clicked on the new parameters are then saved into the corresponding group number (as displayed under *Configuration Group* pull down box).

☞*Note: If everything is grayed out on this page then this is a good indication that the Input Source has been changed to ASI In or LAN In. rather than RF. Check under the* ***System Setup/Input menu*** *to ensure that RF is selected as the Input Source.*

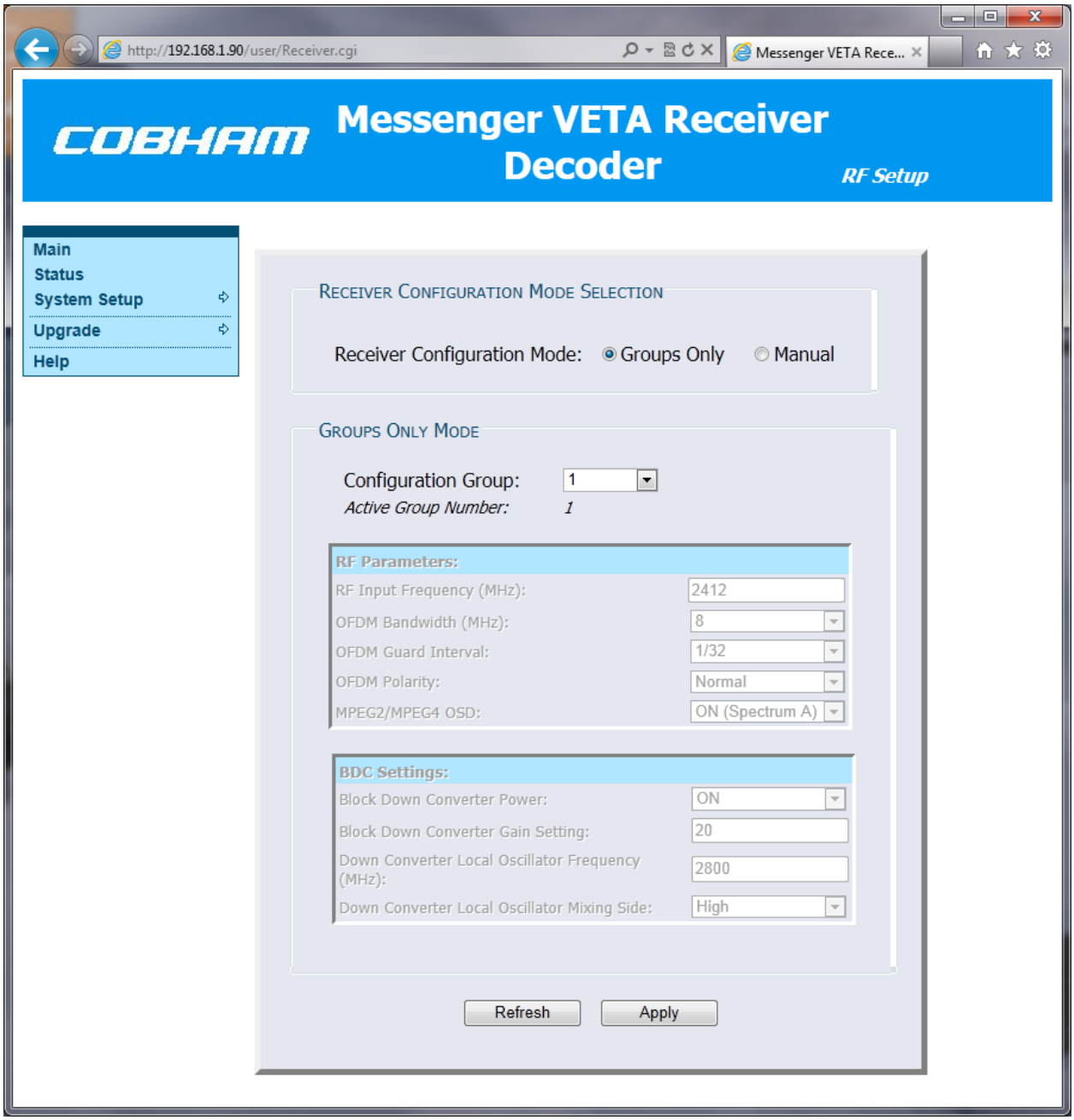


Figure 25 RF Setup- Groups Only Mode

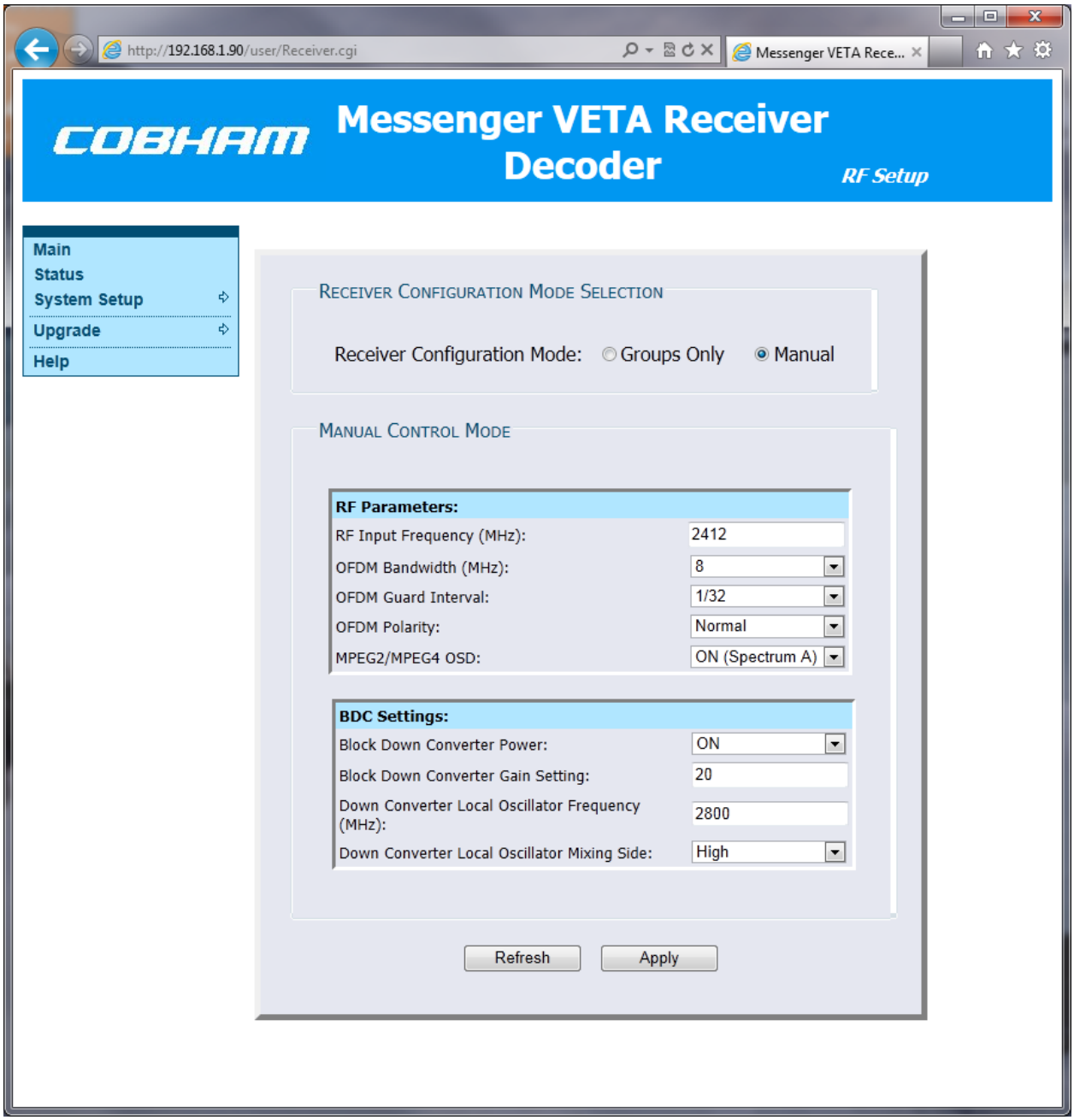


Figure 26 RF Setup-Manual Control Mode

7.3.8 Update Logon

- *Update Logon* page allows either the administrator or the user to change their logon names (user names) and passwords.
    - If logged on as the administrator, the *admin* or *user password* can be changed. Keep in mind the current logon name and current logon password must be entered first (the first two lines, see Figure 27) then a new name and a new password must be entered (the third and fourth lines). Finally the confirmation of the new password must be entered, line 5 (which must agree with line 4). The "Submit" button must be clicked on to activate the new username and password.
    - If logged on as a user, only the user password can be changed.
    - It should be mentioned the *user* has limited rights. For example under the *System Setup* (on the main menu page) the user has access to the *Input*, *Output*, *Decryption* (if available as a purchased option), *Receiver* (groups only mode) and *Update logon* menus. User does not have access to *Genlock* (if available as a purchased option), *Auxiliary data* and *Network* menus. User does not have access to the Upgrade menu (on the main menu page). to upgrade new firmware

Note: The default passwords for the administrator is,
User Name: ***admin***
Password: ***admin***

The default passwords for the user is
User Name: ***user***
Password: ***user***

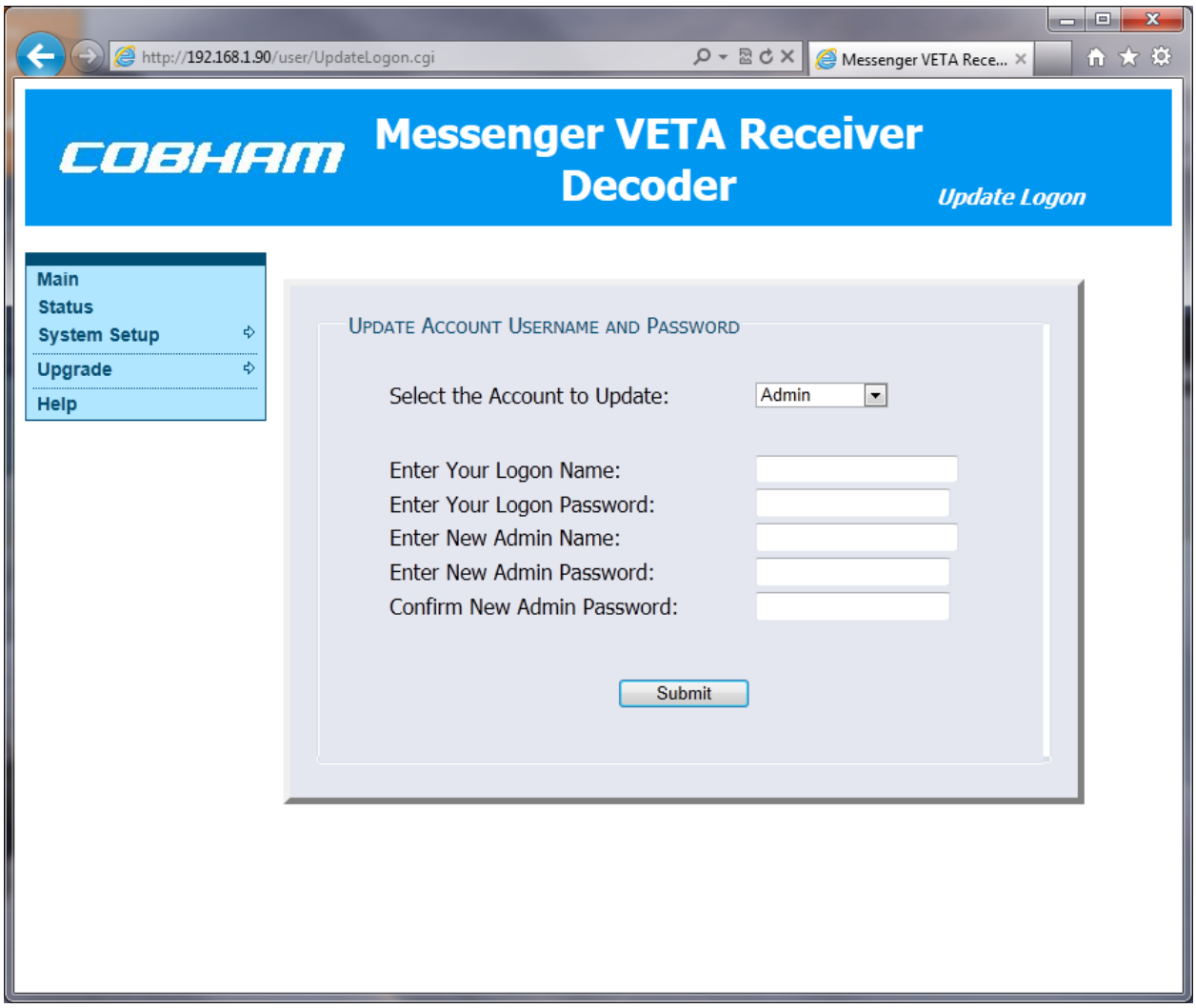


Figure 27 Update Logon Setup

7.4 Upgrade Menu

New firmware (when available) can be updated very fast and easily using the *Upgrade* menu. This menu consists of the ***DSP Firmware***, the **Xilinx Firmware**, the ***Altera Firmware*** and ***Optional Features*** submenus.

- ***DSP Firmware Update*** – from the ***Upgrade*** menu click on the ***DSP Firmware*** submenu, the *DSP Firmware Upgrade* screen opens, see Figure 28. Click on the *Browse* button to search for the file to upload (this file is an ***.out*** file and customer service usually sends a link to our FTP site where the file can be downloaded and placed on your PC). Next, click on the "(Field Upgrade)" button. Finally click on the "Upload File and Program Flash". Wait for the progress bar to complete and the final message that the unit has been programmed successfully. *Note if in addition to the DSP Firmware update if a Xilinx Firmware update is necessary ensure not to power cycle the receiver/decoder until the Xilinx has also been programmed (see section below under Xilinx Firmware Upgrade). Sometimes these two pieces of code work very closely together and the receiver/decoder may need to see both new updates on the next power cycle otherwise the unit may not boot.*
- ***Xilinx Firmware Upgrade*** – from the ***Upgrade*** menu click on the ***Xilinx Firmware*** submenu. The Xilinx Firmware Update screen opens, see Figure 29. Click on the Browse button for the file to upload (this file is a ***.bit*** file and as stated above customer service usually sends a link to our FTP site where the file can be downloaded and placed locally on your PC). Next click on the "Upload and Program Flash" button. As stated above wait for the progress bar to complete and the final message that the unit has been programmed successfully.
- ***Altera Firmware Upgrade*** – the same procedure as stated above under the Xilinx Firmware Upgrade procedure applies here (see Figure 30). The only difference is that the file is an ***.rbf*** file. This file rarely needs to be upgraded.
- After updating the necessary file(s) the receiver/decoder needs to be re-powered (re-booted) for the new firmware to be activated.
- Verification (version numbers) of the new loads can be seen using the front LCD panel under the System Menu (see section 6.5) or under the *HELP* menu if using the LAN GUI WEB interface.
- ***Optional Features*** Submenu – the optional features submenu (see Figure 31) consists of two sections, the *Optional Features Status* and the *Upgrade Optional Features*. The *Optional Features Status* page shows which optional features have been activated. As of this writing *AVC Embedded Audio* and *Auxiliary Data* are considered standard features and should be enabled. The remaining ones, *AVC Genlock*, *LAN Streaming*, *128-Bit Decryption (AES-C or AES/Bcrypt)* and *256-Bit Decryption* (AES-C or AES/Bcrypt) may or may not be enabled depending on if the feature was purchased. The *Upgrade Optional Features* section is where a code word sent from the factory can be pasted in or manually entered to have an optional feature enabled if the feature wasn't initially purchased but later it was decided to upgrade. After entering the code word ensure to click on the *Set* button and then power cycle the receiver/decoder. After the power cycle ensure to re-enter this menu or use the LCD front panel to check that the feature is now enabled.

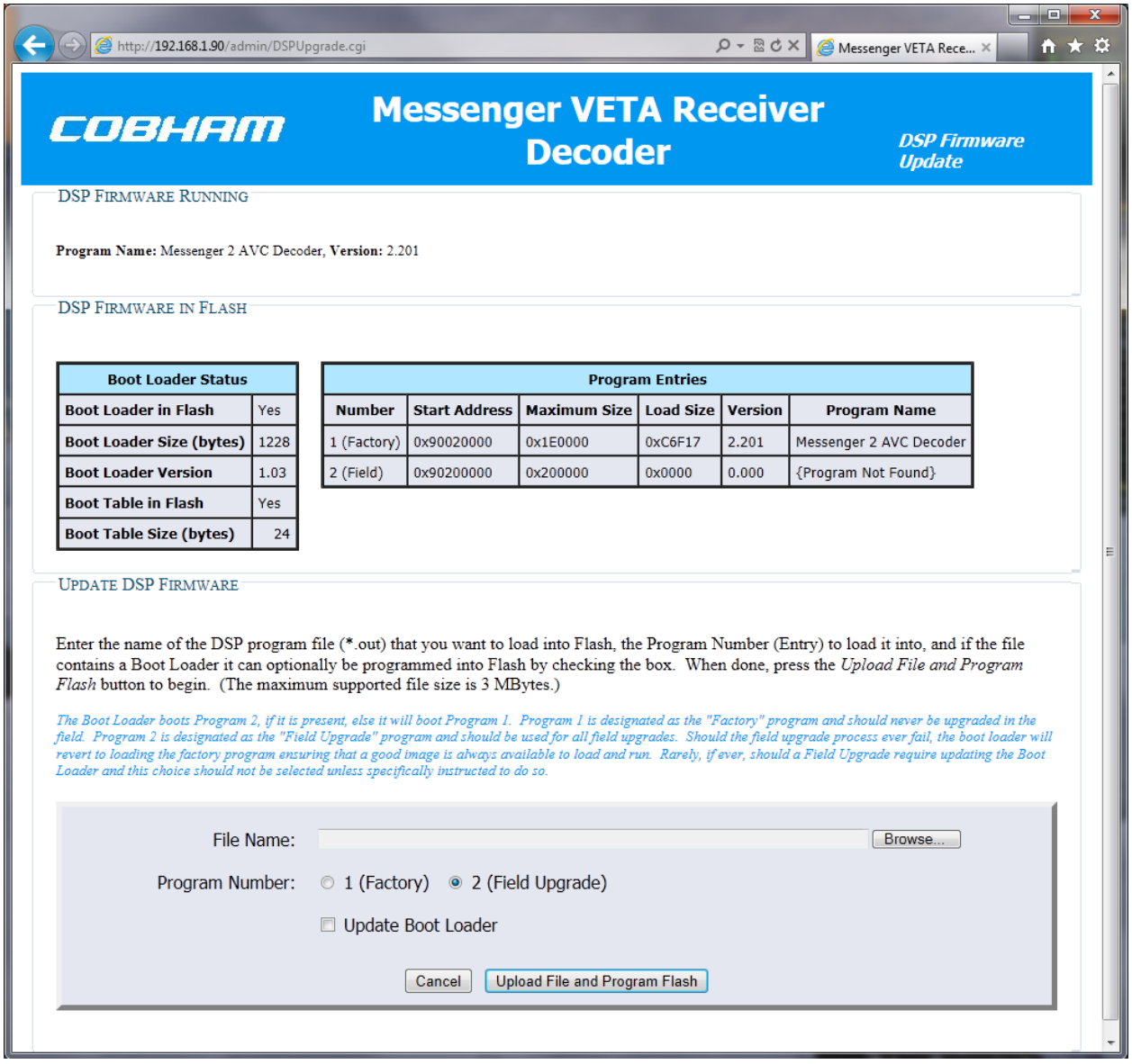

http://192.168.1.90/admin/DSPUpgrade.cgi
Messenger VETA Rece...
COBHAM
Messenger VETA Receiver Decoder
DSP Firmware Update
DSP Firmware Running
Program Name: Messenger 2 AVC Decoder, Version: 2.201
DSP Firmware in Flash
Boot Loader Status
Boot Loader in Flash Yes
Boot Loader Size (bytes) 1228
Boot Loader Version 1.03
Boot Table in Flash Yes
Boot Table Size (bytes) 24
Program Entries
Number Start Address Maximum Size Load Size Version Program Name
1 (Factory) 0x90020000 0x1E0000 0xC6F17 2.201 Messenger 2 AVC Decoder
2 (Field) 0x90200000 0x200000 0x0000 0.000 {Program Not Found}
Update DSP Firmware
Enter the name of the DSP program file (*.out) that you want to load into Flash, the Program Number (Entry) to load it into, and if the file contains a Boot Loader it can optionally be programmed into Flash by checking the box. When done, press the Upload File and Program Flash button to begin. (The maximum supported file size is 3 MBytes.)
The Boot Loader boots Program 2, if it is present, else it will boot Program 1. Program 1 is designated as the "Factory" program and should never be upgraded in the field. Program 2 is designated as the "Field Upgrade" program and should be used for all field upgrades. Should the field upgrade process ever fail, the boot loader will revert to loading the factory program ensuring that a good image is always available to load and run. Rarely, if ever, should a Field Upgrade require updating the Boot Loader and this choice should not be selected unless specifically instructed to do so.
File Name:
Browse...
Program Number: 1 (Factory) 2 (Field Upgrade)
Update Boot Loader
Cancel
Upload File and Program Flash

Figure 28 DSP Firmware Updater

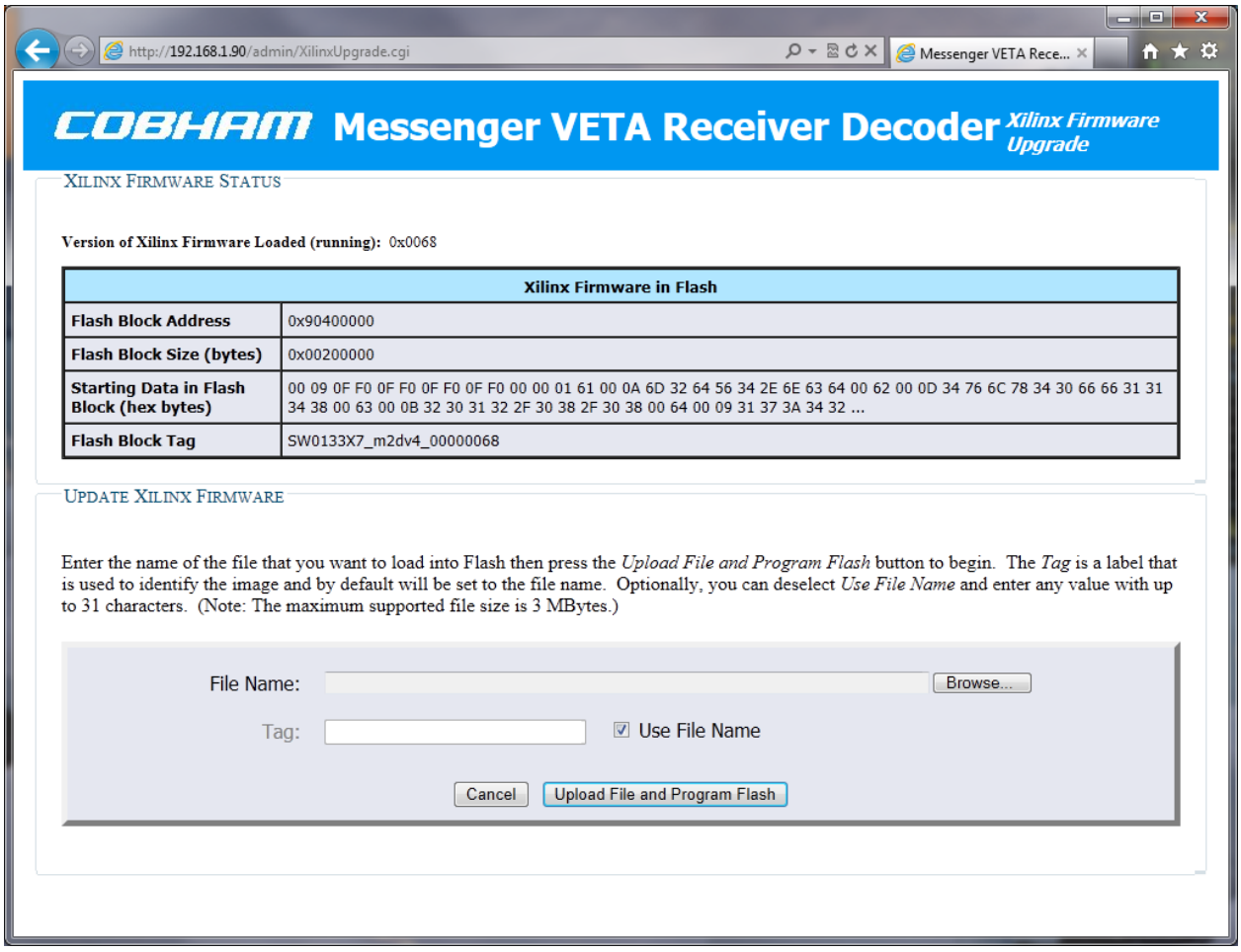
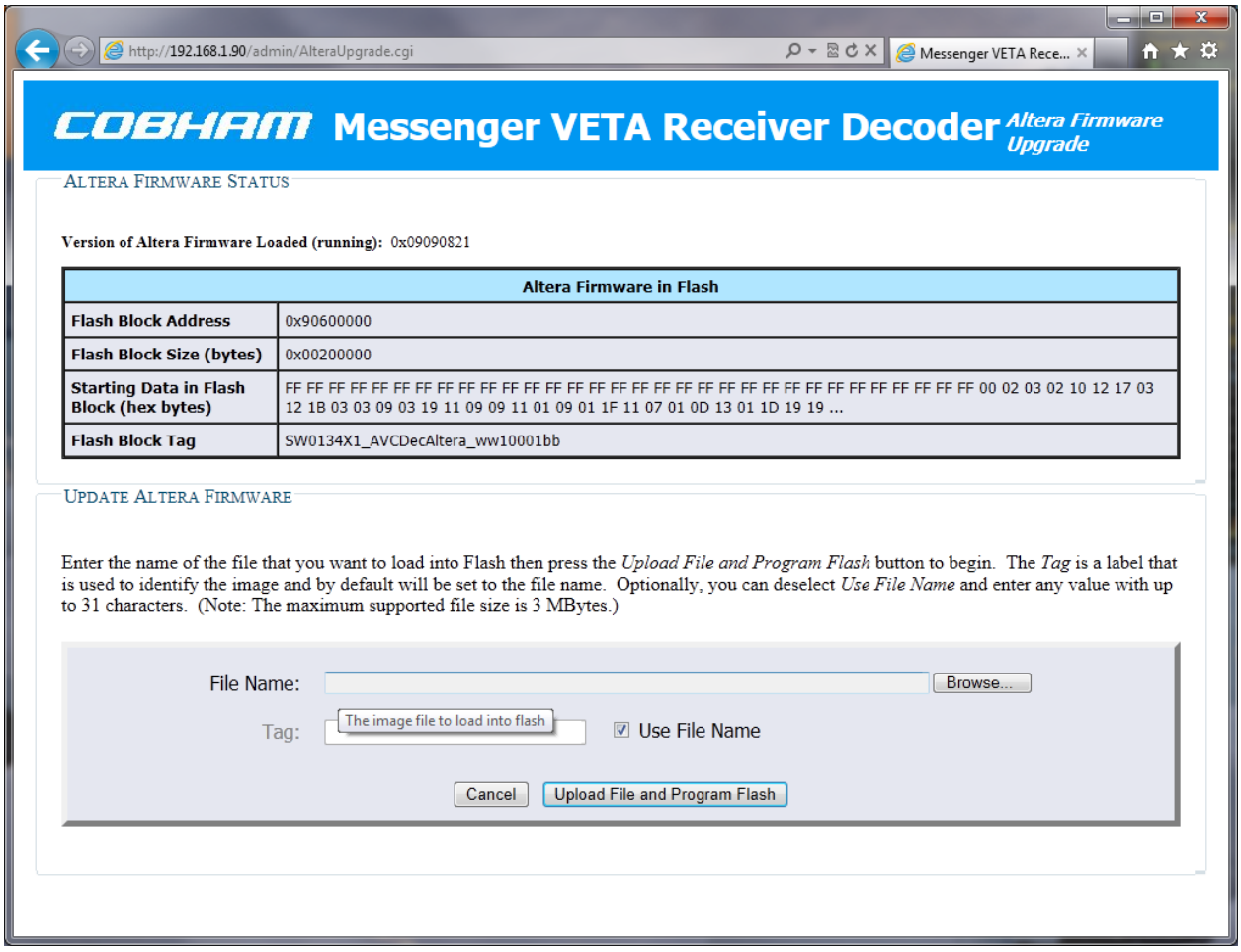

http://192.168.1.90/admin/XilinxUpgrade.cgi
Messenger VETA Rece...
COBHAM Messenger VETA Receiver Decoder Xilinx Firmware Upgrade
XILINX FIRMWARE STATUS
Version of Xilinx Firmware Loaded (running): 0x0068
Xilinx Firmware in Flash
Flash Block Address
0x90400000
Flash Block Size (bytes)
0x00200000
Starting Data in Flash Block (hex bytes)
00 09 0F F0 0F F0 0F F0 0F F0 00 00 01 61 00 0A 6D 32 64 56 34 2E 6E 63 64 00 62 00 0D 34 76 6C 78 34 30 66 66 31 31 34 38 00 63 00 0B 32 30 31 32 2F 30 38 2F 30 38 00 64 00 09 31 37 3A 34 32 ...
Flash Block Tag
SW0133X7_m2dv4_00000068
UPDATE XILINX FIRMWARE
Enter the name of the file that you want to load into Flash then press the Upload File and Program Flash button to begin. The Tag is a label that is used to identify the image and by default will be set to the file name. Optionally, you can deselect Use File Name and enter any value with up to 31 characters. (Note: The maximum supported file size is 3 MBytes.)
File Name:
Browse...
Tag:
Use File Name
Cancel
Upload File and Program Flash

Figure 29 Xilinx Firmware Updater


http://192.168.1.90/admin/AlteraUpgrade.cgi
Messenger VETA Rece...
COBHAM Messenger VETA Receiver Decoder Altera Firmware Upgrade
ALTERA FIRMWARE STATUS
Version of Altera Firmware Loaded (running): 0x09090821
Altera Firmware in Flash
Flash Block Address
0x90600000
Flash Block Size (bytes)
0x00200000
Starting Data in Flash Block (hex bytes)
FF FF FF

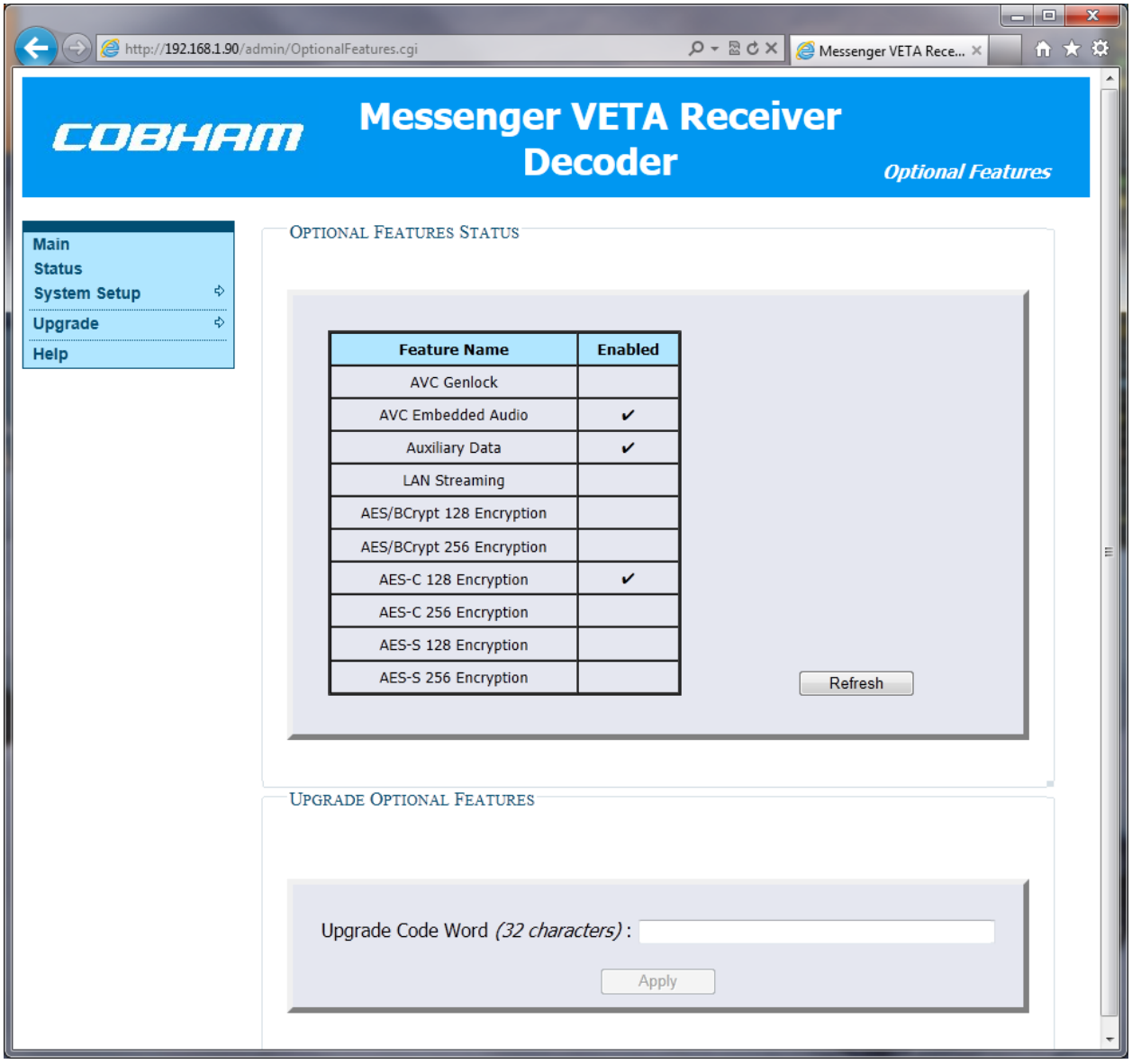


Figure 31 Optional Features Status

7.5 Help Menu

- The help menu (see Figure 32) consists of three sections. *Firmware Information Product Information*, *Optional Features Status* and the *AVC Decoder Support*. The *Firmware Information* shows the current three versions of firmware for the DSP, the Xilinx and the Altera. The *Product Information* shows the receiver/decoder mode, part number, model number identifier and serial number. The *Optional Features Status* shows the current enabled features and finally the *AVC Decoder Support* shows a link to the online support page.

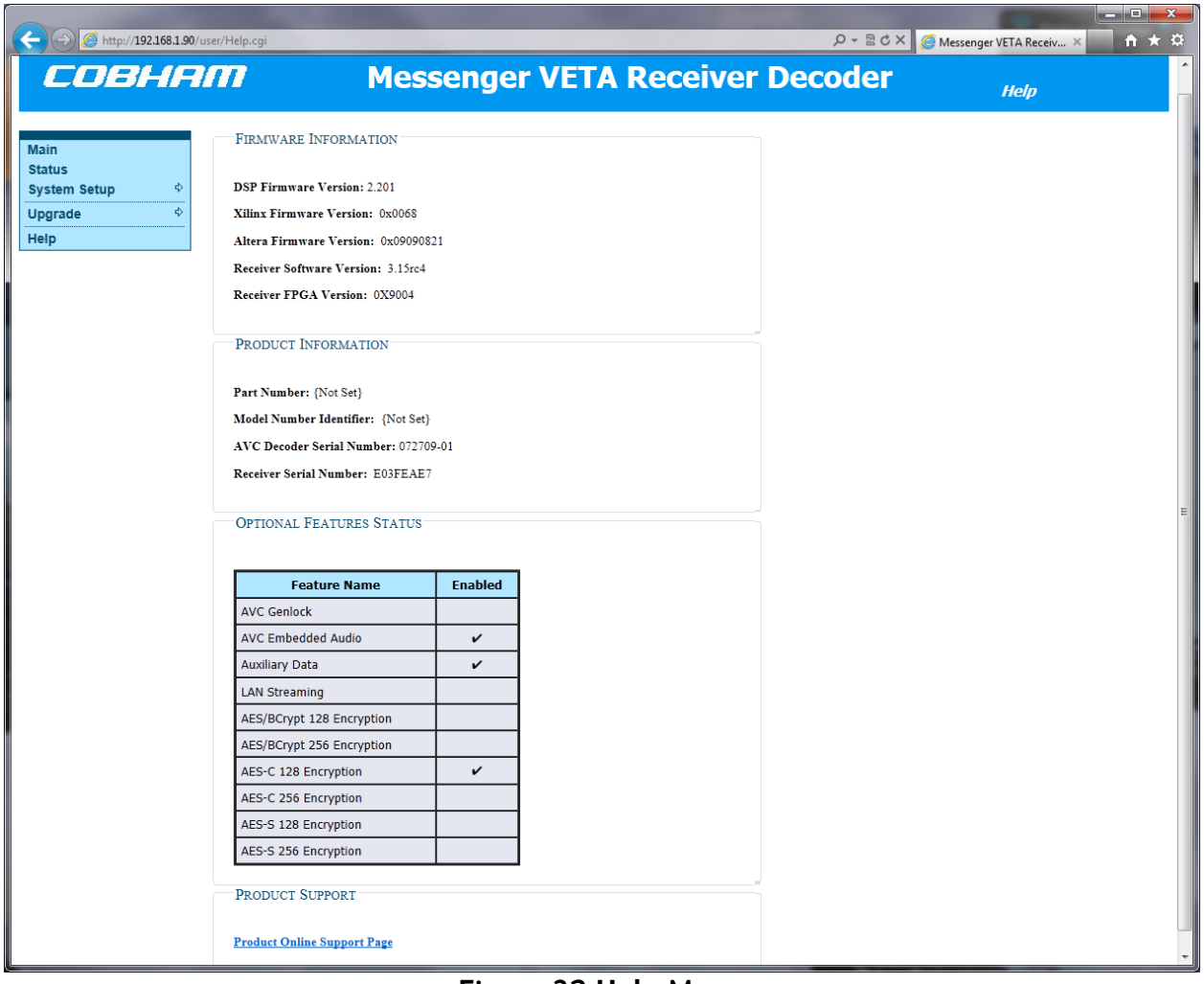


Figure 32 Help Menu

8. Specifications

COFDM RF Input

Input Ports:	2
Connectors:	SMA-F
Input Impedance:	50 Ohms, <1.5:1 VSWR
Input Frequency:	0.9 to 8.5 GHz (In-Bands)
Frequency Accuracy:	(+/-5) ppm

Demodulation

DVB-T # of Carriers:	2 K
DVB-T Bandwidth:	8/ 7/ 6 MHz
DVB-T Guard Interval:	1/32, 1/16, 1/8, 1/4
DVB-T FEC	1/2, 2/3, 3/4, 5/6
DVB-T Modulation	QPSK, 16 QAM, 64 QAM
Optional VETA Narrow BW Modes	
VETA # of Carriers:	400
VETA Bandwidth:	2.5 MHz or 1.25 MHz
VETA Guard	1/16, 1/8
VETA FEC	1/3, 2/3
VETA Modulation	QPSK, 16 QAM
Threshold:	(6, 7, & 8 MHz BW)
QPSK ½:	<-95 dBm
16-QAM ½:	<-89 dBm
64-QAM ½:	<-83dBm

(Optional Diversity can improve threshold by 2.5 dB) VETA BW Threshold: -100 dBm to -105dBm

Serial Transport Stream I/O

General

Ports	RF, DVB-ASI or LAN IP, selectable

ASI Serial TS Input/Output

# of ASI Inputs:	1 , BNC-F
# of ASI Outputs:	1 (loop-through), BNC-F
Max TS Rate:	Up to 31 Mbps

LAN/ IP Serial Input/Output

# of Ethernet Ports:	1, RJ-45
Streaming Format:	RTP/UDP; IP Unicast or Multicast (future update)

Supports MPEG-2 Transport Stream over UDP/IP or RTP/UDP/IP

Output: DVB-ASI input can be reformatted for streaming and output at the same time that it is being decoded.

AVC Decoder (Video, 2 Audio)

General

Compatibility Standard:	MPEG-4 AVC/H.264 Baseline Profile Plus Interlace Support
Bit streams Accepted:	AVC video in MPEG TS per ISO/IEC 13818-2 PES packets per ISO/IEC 13818-1
Video Bit Rate:	1 Mbps to 30Mbps

Video Decoder

Format @ Frame rate:	1080P @ 30Hz, 29.97Hz, 25Hz 1080I @ 30Hz, 29.97Hz, 25Hz 720P @ 60Hz, 59.94Hz, 50Hz 480P @ 60Hz, 59.94Hz, 50Hz 480I @ 29.97Hz 576I @25Hz
Display modes supported:	Letterbox, Cropped
Aspect Ratio:	16 x 9, 4 x 3 (selectable - format dependent)
Systems Latency end to end delay:	down to ˜44ms (w/Messenger AVC TX Only, mode dependent)

AVC Video Output

General

Output connectors:	Qty 1 HD-SDI, Qty 1 HDMI, Qty 1 Component, (SD Only) - Qty 2 – Composite
Output formats supported:	1920 x 1080 Progressive 1920 x 1080 Interlaced 1280 x 720 Progressive 720 x 480 Progressive 720 x 480 Interlaced 720 x 576 Interlaced
Frame rates:	60/50/30, 59.94/29.97, 25Hz (progressive/interlaced) (1080p limited to 30 frames per second max)
Aspect Ratio:	16 x 9 (fixed: 1080I, 720P) 16 x 9, 4 x 3 (selectable: 480P)

HD-SDI (High Definition Serial Digital Interface)

Standard:	SMPTE 292M
Data Bit Rate:	1.485 Gbps
# of Serial Outputs:	1
Connector:	BNC (x1), female

Embedded Audio (Future Option)

Embedded Audio format:	SMPTE299M
Sample rates supported:	48 KHz
Sample rate out:	48 KHz
# embedded Audio:	4 (2 stereo pairs)
Audio types supported:	MPEG2 layer 1 and 2, or ADPCM (Future Option)
Embedded audio control:	Selectable, .type./disable (each pair independently controlled)

Analog Video

SD

Video format standards:	PAL & NTSC Composite
# of Analog outputs:	2
Connectors:	RCA-F

HD/SD

Video format standards:	Component
# of Analog outputs:	1 set (Y, Pb, Pr)
Connectors:	RCA-F

DVI (Digital Visual Interface)

DVI Connector:	DVI-I Socket - female

☛Note: Can be converted to HDMI (Video Only) with external adapter (Sold Separately)

MPEG-2/4 Video Decoding

Compression Standard:	MPEG-2 or MPEG-4
Chrominance Profile:	4:2:0
Line Standard:	525 and 625 (NTSC/PAL)
Horizontal Resolution:	704, 528, 480, 352 pixels
Systems Latency end to end delay:	down to ˜40ms for 6,7, or 8 MHz, Narrow BW down to ˜120 mS (with VETA TX Only, mode dependent)
Video Outputs:	Composite w/OSD
Standards:	NTSC (with and without pedestal) or PAL
Video Connectors:	Qty 2 Composite – RCA-F (One on Front Panel, One on Rear Panel)
Output Impedance:	75 Ohms
Output Level:	1 Vpp
Frequency Response:	10 Hz to 4 MHz, (+/-) 1.5 dB

Audio Decoder

Decoder Capabilities:	MPEG-1, layers I and II MPEG-2, layer II, NICAM (Veta Mode Option)
MPEG-2 PES Formats:	MPEG-2, MPEG-1
Audio Source:	Selected Audio Services 1-4

Audio Output

General

# of Services:	AVC Mode: 4 Mono or 2 Stereo Pairs MEPG-2/4 Mode: 2 Mono or 1 Stereo Pairs

Analog Audio Out

Output Type:	Balanced, 2 channel pairs (+/-), Left/Right
Connectors:	Qty 2 – XLR-M Qty 2- p/o High density 15-pin D-sub, female
Cable w/Optional connectors:	DB-15 to Qty 2 - XLR-M
Impedance:	600 Ohms nominal

Remote Operation/Update Interface

Type:	Ethernet, 10/100 BaseT
Connector:	RJ45

Serial Remote operation interface

Type:	USB
Connector	Part of MISC I/O connector

Front Panel Indicators

Input LED:	Green indicates valid input on selected input, Off indicates no valid signal on the selected input
Error LED:	Red indicates error is occurring OFF indicates no errors detected

Power

DC Input:	+9 to +18 VDC
DC Power:	40 Watts
DC Power Conn:	AMP 172166-1 PIN 1 - +12V PIN 2 – RETURN PIN 3 – CHASSIS GND
Battery Operation	Anton Bauer or IDX
AC Input Option:	Via External Power Supply
Voltage Range:	100 - 120/ 200 – 240 VAC
Power:	Maximum – 200 W
Frequency:	47 – 63 Hz
Line cord:	Detachable, 3-prong
Cooling:	Forced air

General

Operating Temperature:	0 ˚C to 50 ˚C
Operating Humidity:	<95% Non-Condensing

GENLOCK Option

Genlock capability:	AVC HD/SD Only
Genlock Reference:	480i @ 29.97, Ref NTSC “black and burst” 1080i @ 29.97 fps Ref NTSC “black and burst” or 1080i tri-level sync @ 29.97 fps 1080i @ 30 fps – Ref 1080i tri-level sync @30fps 1080i @ 50 fps – Ref 1080i tri-level sync @50fps 720p @ 50 fps – Ref 720p tri-level sync @ 50 fps 720p@ 59.94 fps–Ref 720 tri-level sync @ 59.94 fps 720p @ 60 fps – Ref 720 tri-level sync @ 60 fps

Appendix A – Default Settings C2-Band

PARAMETER	CONFIGURATIONS															
Config #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Unit Mode	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T
BDC LO	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200
BDC Side	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
BDC Gain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COFDM BW	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	6Mhz	6Mhz	6Mhz	7Mhz	8Mhz	8Mhz	8Mhz
RF Frequency	4400	4700	5000	4400	4700	5000	4400	4700	5000	4400	4700	5000	4400	4400	4700	5000
Modulation GI	1/4	1/4	1/4	1/8	1/8	1/8	1/8	1/8	1/8	1/32	1/32	1/32	1/16	1/4	1/4	1/4
OFDM Polarity	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
NTSC Format	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC
Blue Screen on no Video	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MPEG4 deblocking Filter	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
On screen Display	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Auto Spect Detect	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Descrambling	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LNB Power	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Power up Video Format	525	525	525	525	525	525	525	525	525	525	525	525	525	525	525	525

Appendix B – Configuration Map

M2T Group Number	MVRD Group Number	M2T Group Number	MVRD Group Number
GP1	GP10	GP11	GP7
GP2	GP11	GP12	GP8
GP3	GP12	GP13	GP9
GP4	GP10	GP14	GP7
GP5	GP12	GP15	GP9
GP6	GP10	GP16	GP7
GP7	GP11	GP17	GP9
GP8	GP12	GP18	GP7
GP9	GP10	GP19	GP9
GP10	GP12	GP20	GP9

Appendix C – Troubleshooting Section

Fault	Action
No RF Link	• Check if Input Source selected as RF • Check if the following parameters of the Transmitter and corresponding Receiver match: -Frequency and Bandwidth -Guard Interval -Spectral Inversion • Check if the down converters operate correctly: -Correct LO is set -BDC power is On.
Poor Link Performance	• Interference. Should an interfering RF signal occur on the same frequency the performance of the link will be affected. Remove the interferer or move to an alternative frequency. • Reduced transmit power, ensure that the attenuation setting on the transmitter is appropriate for direct output, or for amplifiers connected. • No Diversity operation. Ensure both down converters are operational.
Blue screen or Frozen screen at receiver	Check RF/Demod Lock– see "No RF Link" section above. If Demod Lock is OK but Packet errors are not 0 then see section Poor Link Performance above. If the RF/Demod Lock is OK and packet errors are 0 then - Check video is enabled at the transmitter with the proper/matching format. -Check correct unit name is selected at the receiver to match the transmitter. -Check scrambling keys are matched.
Reduced Image quality	•Image quality is affected by the selected horizontal resolution. The image will become progressively softer for each horizontal resolution below the sharpest resolution of 704 pixels. It is advisable to select a horizontal resolution that matches the resolution of the camera. •Image quality is also affected by the video bit rate which can be read from the video bit rate field of the transmitter controller. The standard setting is 2.3Mb/s. However enabling audio, particularly the high quality audio modes, will reduce the video bit rate substantially. Therefore ensure an appropriate audio mode is selected or audio is fully disabled.
No Video Out	•TS = Y, PRG = Y and VID = Y Check the video out BNC connectors and ensure they are

	correctly connected to the video monitors, that the video monitors are on and they are capable of receiving the format indicated. • TS = Y, PRG = Y and VID = Y but no video format is displayed Ensure video source into the TX is present and the selected video format of the TX and MVRD are the same
No Audio	•Ensure Audio is enabled in the TX. • Ensure the volume level is sufficient (either at the transmitter end or an external amplifier)
Genlock Error	•Genlock is on but MVRD can't lock to the reference Genlock clock. • Genlock reference input signal does not match the video format which is decoded.

Appendix D – References

For more detailed information on Cobham products described in this manual, download the manuals below from Cobham's WEB site (www.cobham.com/tcs) or contact Cobham customer Service department.

- Operations Manual, MVRD 100-M0144
- Operations Manual, VETA Receiver 100-M0087
- Operations Manual, VETA Receiver SW 100-M0131
- Operations Manual, VETA Transmitter 100-M0089
- Operations Manual, M2D Decoder 100-M0134
- Operations Manual, M2TE Transmitter 100-M0171